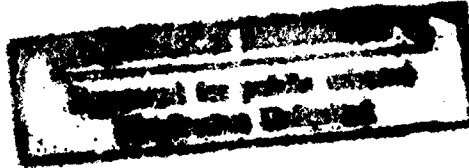


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13 NOVEMBER 1986



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USSR Report

MILITARY AFFAIRS

FOREIGN MILITARY REVIEW

No 4, APRIL 1986

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13 NOVEMBER 1986-

USSR REPORT
MILITARY AFFAIRS
FOREIGN MILITARY REVIEW

No 4, April 1986

Except where indicated otherwise in the table of contents, the following is a complete translation of the Russian-language monthly journal ZARUBEZHNOYE VOYENNOYE OBOZRENIYE, published in Moscow by the Ministry of Defense.

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FOREIGN MILITARY REVIEW

U.S. "STAR WARS" PROGRAM

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 4, Apr 86 (Signed to press 7 Apr 86) pp 7-14

[Article by Col I. Ignatev; "The U.S. "Star Wars" Program"]

[Text] The use of space as the area of scientific-technical progress is objectively becoming an important means of solving mankind's common problems: energy, food, ecological, and others. In view of its international character and the global scale of its potential consequences, it directly affects the interests of practically every state on the globe. It requires their close cooperation on questions of the peaceful use of space, and avoiding its militarization, as space is the "common legacy of mankind."

Until now, thanks to the persistent efforts of the Soviet Union, a number of international legal restrictions on military activity in space have been enacted. However, the constantly obstructionist policies of the U. S. stand in the way of comprehensive agreements in this area. Since the late 1950s, the United States has sought to put the unique possibility of space technology at the service of its military. As a result of these efforts they have almost 100 functioning satellites of various space systems and launch another 15-20 new military satellites each year. These systems are used for communications, troop control, navigation, cartography, weather and reconnaissance and are not considered in a direct sense to be space weapons and do not pose the threat of direct attack.

However, the situation could change significantly in view of the U.S. intention to begin development and deployment of strike weapons designed to destroy targets in space or on earth from space. The Pentagon's activities towards militarizing space became especially animated after the Presidential directive on national space policy (1982). The main goals of this policy were declared to be "national security" and protection of the "vital interests" of the U.S. in space. To achieve these goals, the American leadership, in accordance with the directive, unilaterally reserved the right to undertake actions of a military character in space. Further steps by U.S. militarist circles demonstrated their desire not only to achieve superiority over the Soviet Union in space, but also to disrupt the established strategic parity by deploying space weapons and to open still another avenue in the arms race. The

so-called "Strategic Defense Initiative" (SDI), to which even the Western press assigned the more accurate name of "Star Wars" is a vivid example of this.

SDI was officially announced in March 1983, as a long-term program to create a multilayer antimissile defense system (ABM) system with space-based components directed against the Soviet Union. As stated by the U.S. Administration, this program supposedly pursues the goal of complete liquidation of the threat of ballistic missiles, and strengthening stability and international security, while in fact it is aimed at depriving the USSR of the possibility of a counterstrike. In the process, the fact that the U.S. militarists are conducting research in this area against the backdrop of a further buildup of American strategic offensive weapons and that they intend to use the results to create a space attack weapon which would be capable of appearing almost instantly over the territory of any state, creating a real threat to space, airborne and ground targets, are completely suppressed. In effect, as M.S. Gorbachev succinctly characterized this program in a talk with the editor of PRAVDA, "they talk about defense, but prepare for an attack; proclaim a space shield, but wave a space sword; promise to eliminate nuclear weapons, but in fact build up and improve them. They promise the world stability, but act to disrupt the military balance. Whatever they call it, 'Strategic Defense Initiative', space 'shield', etc., they represent a danger to the people. Therefore, the pivotal question of our time is the prevention of an arms race in space and curtailing it on earth. The American 'Star Wars' program remains the chief impediment on the way to solving these problems."

The new "initiative" signified a complete reorientation of efforts in the United States toward militarization of space. Starting in 1983, all RTD&E plans concerning ABM were quickly reviewed, a program for further research drawn up and a preliminary assessment of the possibility of practical implementation of the concept of a multilayered system with space-based elements was conducted. At that point the plans included a study of all technical means which could potentially find application in the prospective ABM system, including means to intercept operational-tactical and tactical missiles. As a result, SDI turned into the U.S. Defense Department's largest RTD&E program for which more than 5 billion dollars were allocated in a short time (FY 84-86).

According to press information, the structure and possible combat composition of the ABM system being created within the "Star Wars" framework have not yet been finally determined. However, it is expected that they will include no less than three echelons designated for destruction of ballistic missiles on all main sections of flight trajectory (Fig. 1)

The main role in the system is played by the first echelon, whose weapons must destroy ICBMs immediately after launch, within the first 3-5 minutes of flight, i.e., before separation of the warheads. American specialists believe that missiles on that portion of flight trajectory turn out to be large and sufficiently vulnerable targets which are easier to detect and destroy. as a result of their destruction, all the warheads on the ICBMs with separable heads would be immediately put out of action, thereby achieving maximum combat effectiveness. The second echelon is designed to destroy warheads on missiles

along the entire course of their flight beyond the lower levels of the

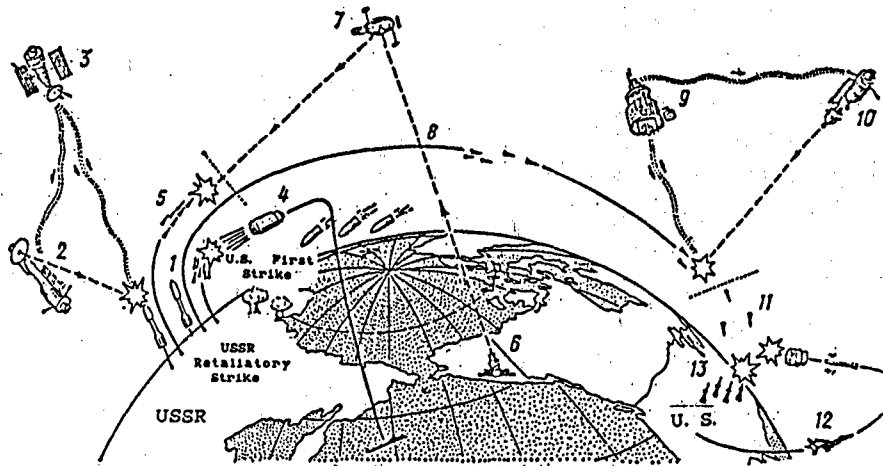


Figure 1. Concept of the American Multi-Echeloned ABM System with Space-Based Elements

1. ICBM trajectory powered flight phase.
2. Combat space station.
3. Early warning satellite.
4. Submarine-launched missile with X-Ray laser.
5. ICBM warhead separation (warhead separation and detachment of false targets).
6. Powerful earth-based laser installation.
7. Superreflecting orbiting mirror.
8. Warhead mid-course trajectory.
9. Satellite for tracking, identification and target designation.
10. Space platform with accelerator weapons.
11. Warhead terminal phase.
12. Airborne intercept missile installation.
13. Long-range and close-in anti-missile missiles.

atmosphere. The third echelon must intercept targeted warheads after they enter the lower levels of the atmosphere where recognition is easier due to natural braking and the slowness of the lighter false targets.

According to the author's plan, the main components of the multilayered ABM system would be means of detection, tracking and recognition of ballistic targets, directed energy weapons and kinetic (conventional) weapons and combat command and control equipment.

In order to detect, track and recognize targets within the SDI framework, radar and optical (infrared) means designed chiefly for space platforms and aircraft are being developed. As well as special missile platforms launched to meet incoming warheads at the signal of an early warning system.

In the directed energy weapons area, research embraces powerful lasers (including X-ray with nuclear pumping), elementary particle accelerators and electromagnetic radiation (UHF) generators. Military space stations with laser and accelerator weapons with the exception of X-ray lasers are designed for permanent space deployment. X-ray lasers whose energy source is a nuclear explosion are expected to be launched in the direction of their targets by means of rocket platforms from submarines at the signal of an early warning system. In the case of ground basing for these powerful lasers, it is expected that their beams will be guided to the ICBM warheads by large mirrors on space platforms.

As for kinetic weapons, long- and short-range ground antimissile missiles, as well as electro-magnetic cannon and space based jet-propelled charges, are being developed.

For centralized control of these components super-computers are being developed, artificial intelligence research is being conducted and new machine languages and algorithms developed. At the same time, in order to evaluate the practical possibilities of creating an ABM system, the general need for energy sources, the survivability of individual components and the methods of organizing the utilization of space weapons in orbit are being formulated.

Work on the SDI program at present is still directed at solving basic problems, research into possible variants to an ABM combat system, and experimental testing of individual technical solutions.

As reported in the foreign press, as part of the plans for creating a new offensive weapon, tests of X-ray lasers are continuing on a range in Nevada. In 1984-85, the intercept of dummy MINUTEMAN ICBM warheads at great altitudes was accomplished at the American Kwajalein air defense range (in the Pacific Ocean) using an experimental long-range homing anti-missile missile, and on the range at White Sands (New Mexico) several launches of close-range antimissile missiles were carried out. On the same range, the Americans conducted an experiment to destroy a TITAN ICBM body held stationary on earth with an experimental laser unit from a distance of almost 1 km. In the summer of 1985, a series of experiments on low-power ground lasers were conducted on a range in Hawaii to work out methods to track rapidly moving targets with lasers. The unit's laser beam was directed at small reflectors located on DISCOVERY in its orbital stage (the shuttle's 18th flight) and on special missiles launched to a great height specially for this purpose. Tests are being conducted in the University of Texas laboratories on an experimental cannon and, simultaneously the development of a more modern model with an aimable barrel almost 40 m long is going on.

Special attention is being paid in SDI to creating a directed energy weapon. American specialists see this weapon not only as the main component of the prospective ABM system, but also as a potential means of destroying space targets, strategic bombers and cruise missiles in flight. The levels of laser power reached permitted the U.S. Defense Department back in the early 1980s, to conduct field tests to destroy, with ground and air laser units, such moving targets as radio-guided drones, air-to-air missiles and anti-tank missiles. The most immediate goal of the research is completion of the "Space

laser triad" program intended to test a scale model of a combat laser unit first on the ground and then on board the shuttle.

Work on new-in-principle new types of weapons is being conducted in such major U.S. research centers as the Lawrence Livermore Laboratories (workforce of approximately 8,000), the Los Alamos National Laboratory (7,500 highly-qualified specialists) and the Sandia Company's laboratories (6,900 scientists). The Livermore laboratory's annual budget is almost 800 million dollars, half of which is spent on SDI and other military programs. Within the domain of these organizations are powerful elementary particle accelerators for military research. They develop various types of lasers and study the mechanism of the effect of directed streams of energy on construction materials and radioelectronic devices.

Proponents of the U.S. military industrial complex emphasize at every turn the supposed strictly research nature of the SDI program. However, judging by foreign press announcements, along with RTD&E, it envisions both production and deployment of an anti-missile combat defense system. Realization of the whole program is expected to take place in four stages. The first stage (to the 1990s) encompasses all the basic research. In the second, mockups, test models and individual components will be tested and in the third and fourth, construction of a multilayer ABM system with space-based elements will be begun and completed. It is expected that more than 30 billion dollars will be spent in just the first year of this "research" and, according to the estimates of American experts, up to 70 billion dollars could be spent in just ten years. Total expenditures on the program over 20-25 years, including the deployment of a complete multilayer system, they suggest, could reach the fantastic sum of 1-1.5 trillion dollars.

In view of this, U.S. official circles have announced, in order to placate the American taxpayers, that the ABM system would be deployed only in the event that a high degree of effectiveness and survivability is evidenced and that estimated costs would be lower than the Soviet Union's expenditures on the creation of a reliable means of overcoming such a system. Pentagon strategists likewise do not exclude the possibility of deploying some sort of "interim" system utilizing such traditional means as anti-missile-missile and ground radar stations, supplemented by airborne means of detection and target designation. It is believed that the main goal of such a limited ABM system is to provide cover for the most important sites of the strategic offensive forces within the country's territory.

The American leadership is intent on continually intensifying the pace and amount of work on the SDI program until concrete results are achieved. According to numerous announcements by Washington officials, the likelihood of rejecting this program is discounted both in the research stage as well as in the case of the evolution of the multilayer ABM, should its development prove possible. Leaders in the U.S. military-industrial complex have associated with the program plans not only to build the system, but also to develop other types of offensive weapons and military equipment quickly. In the opinion of a number of American specialists, the technical means thought up within the SDI framework are inherently incapable of serving as an effective offensive strike weapon and of finding application in other areas of military affairs. The

program's imperial bent towards attaining general military and technological superiority over the USSR and the other countries of the socialist community is clearly in evidence here.

In consideration of the program's far-reaching goals, it was assigned a high priority among other weapon development programs and a special directorate was established in the Pentagon to coordinate all its projects. Involved in the work in this area are a number of national directorates and chief commands including the Unified Space Command, service commands as well as the Energy Department, and other agencies and individual organizations. Consortia of the main aerospace firms and research organizations were formed to work in specific areas. It was recommended that frequent use be made of the shuttle spacecraft, which officially belongs to NASA but actually is now used by the Pentagon without restriction.

In line with its scientific-technical potential, the U.S. is trying to attract its NATO allies and Japan into the "Star Wars" program, is putting pressure on all fronts on these countries and is attempting to obtain political approval of its course at the governmental level. However, sensible politicians have expressed concern that with the deployment of such a system, the United States' role in NATO will increase, and with the appearance of an analogous system in the Soviet Union, should an armed conflict erupt, the American command would attempt to limit it to the geographic boundaries of the European TVDs. Besides this, the countries of the West have seen in the U.S. proposals an attempt at the unilateral use of its scientific-technical potential for its own purposes, the result of which would be a "brain drain" and diversion of their own resources. The U.S.'s intention to restrict the transfer of the results of this research and of new technology also does not suit them.

In order to overcome the disagreements which have come up, Washington was quick to assure its allies that the security of Western Europe was inseparable from the security of the U.S. and, in order to peak the Western European countries' interest, proposed to place orders not only for research but also for production of individual components of the system. At the same time, the U.S. agreed to allow participation in certain secret research and offered its assistance in creating a European system to destroy enemy operational-tactical missiles, having included the corresponding developments in the SDI program. As a result of U.S. pressure, Great Britain, the FRG, Italy, Belgium and Portugal have given their support to "Star Wars" at present. The Canadian government refused official participation in the program but decided, however, not to block the enlisting of domestic industrial companies. The Japanese government took an analogous position by expressing its "understanding" of the American goals. France, the Netherlands, Denmark, Norway, Greece and Australia have opposed the program.

The prospects for the construction and practical deployment of a multilayer ABM system with space-based elements are assessed in various ways in the U.S. According to the statements of administration representatives, "real progress" will supposedly be achieved in carrying out the SDI program that would permit a significant cut in the general operational time frame in comparison with the initial schedule. They maintain that these schedules will be determined for the most part by the results of research in directed energy weapons, without

which the building of an effective system to defend against a massed nuclear missile strike would be impossible. Certain American specialists involved in the program express the opinion that the final decision on building combat models of these weapons might be made within five or six years. In general, the system's proponents in the U.S. government and military-industrial complex confirm that its deployment will be realized in the next decade.

In addition, there is a significantly widespread opinion that such a system will turn out, in the final analysis, to be the "21st century Maginot Line." As the Western press notes, the most objective study of all the SDI program was conducted by the American public organization, The Union of Concerned Scientists, which published a special report in March 1984. As a result of careful analysis of the available data, the report's authors, including prominent U.S. physicists, came to the common opinion that building an effective ABM system to protect a country's territory is practically impossible at this stage. The report's main conclusions, as well as other American specialists' reviews of it in the foreign press, state that in the foreseeable future there will be no success in building laser and accelerator weapons of sufficient power, in deploying the necessary energy sources, or in arranging for regular production of the most important technical equipment. These scientists believe that the most complex technical tasks are the organization of ABM combat control equipment and the development of the corresponding programs and algorithms. The practical rendition and testing of the combat control system under real conditions could never take place, with the result that any error would produce catastrophic consequences. Due to the necessity of quickly putting the system into operation immediately after detecting a missile launch, control of all resources must be entirely automated. That would significantly limit the human role in decision-making at the most responsible stage and additionally increase the possibility of loss of control and spontaneous malfunctions.

Besides this, the development, deployment and subsequent use of such a system, especially its space components, are associated with not only financial expenses, but also with the expenditure of tremendous human and material resources. In American specialists' estimation, one could compare the SDI program, just in its research stage, to eight Manhattan Projects and that it requires enlisting 40,000 highly-qualified scientists and engineers. In order to deploy the necessary resources in space, the U.S. must develop new powerful booster rockets and carry out hundreds of shuttle launches each year.

It is well known that the present maximum shuttle payload does not exceed 30 tons, that one launch costs 150-250 million dollars and that they plan for 20-24 yearly launches only by the mid-1990s. The January 28, 1986 catastrophe during the launch of the orbital stage of CHALLENGER (the 25th shuttle flight), significantly complicated these plans and once again showed the danger of putting weapons in space and the illusory nature of counting on absolutely flawless operation of space technology.

Judging by Western press reviews, the SDI program has met broad opposition not only from the American, but also the world public. In the U.S. itself, the gloomy prospects of "Star Wars" evoked a sharp split in scientific circles and became the subject of bitter discussions on the problems of assuring

international security. Thus, 54 Nobel laureates and more than 700 members of the U.S. National Academy of Sciences signed an appeal to the Administration demanding a halt to the SDI program and more than 1,000 scientists from 39 American universities refused to participate in development of the new convolution in the arms race. Above all, the possible negative consequences of deploying combat anti-missile defense systems worries the progressive public. These consequences include squandering tremendous resources, feverish escalation of the arms race, an increase in tension and a significant decrease in international security.

In American military specialists' opinion, as long as the creation of an ABM system would not in itself solve the problem of complete defense of the U.S. from all types of air-space attack, it inexorably entails execution of other long-term projects. In particular, in conjunction with the SDI program, the Pentagon is already nurturing plans to completely modernize the ABM system of the North American continent, the cost of which, as the specialists suggest, could be even around 50 billion dollars. These plans, which call for the wide involvement of Canada as a partner in joint air-space defense of North American (NORAD), were discussed at the meeting between the U.S. President and the Canadian Prime Minister, M. Mulroney in March 1985.

Continuation of work on SDI will lead, they believe, to a complete loss of perspective in achieving mutual trust, to a disruption of the established strategic balance and a rejection of restraint in the development of strategic offensive weapons. The chief goal of both countries is to accumulate these weapons up to a level that would assure the capability to overcome defensive systems. The opinion is also expressed that even the beginning of deployment of this system could provoke a conflict in that neither side would want to passively watch the deployment of a strike weapon over its territory that has great destructive power. The first most likely casualty of Washington's space plans, they expect, could be the arms limitation process, including one of the most important elements of this process, the Soviet-American agreement on limitation of antimissile defense systems of 26 May 1972.

It is well known that this agreement contains provisions banning both countries from creating the basis of territorial ABMs, the development of ABM components outside the boundaries of the permitted restricted geographic regions, transfer of technology and deployment of such systems on the territory of other countries. The creation, testing, and deployment of sea, air, space and mobile ground systems is also banned, and limitations on the development of an anti-missile weapon, based on new physical principles, was also put in. On the whole, the spirit and letter of the agreement attest that it was based on an expectation of the parties' refusal to deploy any large-scale ABM system as one of the essential factors in the cause of restraining the race in strategic offensive weapons.

The research and the ultimate goals of the SDI program fly in the face of the previously mentioned provisions of the agreement, which has been repeatedly reported in the foreign press. The incompatibility of "Star Wars" with the agreement's obligations is obvious. However, the White House is attempting to distort the essence of the matter, trying through "word games" or the arbitrary introduction of amendments to the sense of the agreement to prove

the legality of research and testing going on in the U.S.

The Soviet Union firmly adheres to the agreements and consistently favors prevention of the militarization of space, opposes deployment of a new strike weapon in space under the guise of a defensive system. The White House's assertion of its desire to strengthen international security by moving to possession of such a weapon can lead no one astray. "Star Wars" cannot be viewed as anything other than an attempt by the U.S. to increase its offensive potential, disrupt the strategic balance and create the conditions for constant armed blackmail against the Soviet Union and other countries, as well as for an unanswered nuclear attack. However, Washington underestimates the Soviet Union's potential to prevent an American monopoly in space. At a press conference in Geneva, M. S. Gorbachev announced with great openness, that the response to the U.S. actions "will be effective, less costly and may be carried out in a shorter period."

The arms race and the development of military technology on the whole has now reached a critical level, beyond which the situation could become uncontrollable. The American plans to saturate space with strike weapons was roundly criticized by the Soviet Union, but not out of fear as some in the West put it. Its position on this question is based on the firm conviction that a total ban on such a weapon would exert a profound positive influence on the entire nuclear arms limitations process and is a firm basis for strategic stability and international security. Recognizing its lofty responsibility for the fate of the world, the Soviet government called upon the U.S. administration to begin to destroy nuclear weapons instead of creating weapons supposedly designed to counteract them.

The chief obstacle on the road to the peaceful opening of space by the forces of all mankind are the plans to conduct "Star Wars" and programs for the U.S. to further accumulate strategic nuclear and conventional weapons. Under these conditions, a special responsibility for the Motherland's defensive potential, defense of the gains of socialism and protection of the peaceful labor of our people lies upon the Soviet Armed Forces. As was emphasized in the 27th CPSU Congress, they must show great vigilance, be in constant readiness to stop imperialism's hostile intrigues against the USSR and its allies, and to give a rebuke to any aggressor from wherever he may come.

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FOREIGN MILITARY REVIEW

ENGINEER SUPPORT OF COMBAT OPERATIONS IN THE JUNGLE

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 4, Apr 86 (Signed to press 7 Apr 86) pp 22-25

[Article by Col (Res) Yu. Korolev, Candidate in Military Science, Docent, Col (Res) V. Shamshurov, Candidate in Military Science, Docent; "Combat Engineer Support in the Jungle"]

(Based on the views of American Military specialists)

[Text] The Pentagon, while carrying out a large number of measures to further increase the combat power of its armed forces, is paying much attention to field training the forces which are intended for aggressive actions in the various parts of the earth which are declared to be areas of "vital interest" to the U.S. Even Southeast Asia and the contiguous areas of the Pacific Ocean meet this description. A major American force is already concentrated there which, in numerous exercises, is developing the capability to conduct combat under specific circumstances in that theater, even in the jungle. All types of combat and combat service support play important roles in this, including engineers.

GENERAL SITUATION As noted in American regulations and manuals, especially those concerning military operations in the jungle, engineer support comprises practical actions by organizations (including specialized ones), units, and formations whose goal is to create favorable conditions for the force, to create the maximum difficulty for the enemy, and to reduce the effectiveness of his fires. The American Department of the Army believes that engineers should have missions to support the required rate of advance of their forces and reduce the enemy rate of advance, to carry out a variety of engineering measures for constructing strong points, personnel cover, camouflage, etc., as well as construction maintenance of routes and roads, conducting crossings over water barriers, preparing positions for field artillery, construction of air fields and landing zones, etc.

Engineer support of combat operations is conducted in accordance with manuals and directives, but the peculiarities characteristic of the jungle are taken into consideration. These areas occupy broad regions with humid tropical and subtropical climates and swampy soil. High temperatures are present for long periods and tropical rain showers create high humidity. The difficult climatic

conditions have a constant effect on personnel located in these areas. Jungles are serious obstacles to heavy combat equipment operation, and isolation of the roads to separated regions prevents concentration of large forces and operations by major groups of forces. All of this substantially restricts the mobility of brigades and battalions, observation, and communication, and adds to the difficulty of combat engineer support.

Based on experience from their aggression in Indochina, the American leadership suggests that combat in the jungle will be carried out by small units (up to an infantry battalion with reinforcements). Therefore problems in planning engineer support should be resolved in separate circumstances in accordance with the mission and not on whether it is in the offense or defense. The principal missions for this type of combat support are the following: engineer reconnaissance, engineering preparation of troop deployment areas and firing positions, determining the design of enemy fortified positions, preparation of routes, construction of field air strips, building air fields for airplanes and helipads for helicopters, providing water, conducting crossings, etc.

Engineer reconnaissance in the jungle is organized with consideration of the difficulty in observation and orientation, the climatic conditions, and other factors. It is noted in the foreign press that air observation often is fruitless due to the thick canopy, and in the rainy season due to low clouds, fog, smoke, and other climatic phenomena. Therefore, it is recommended that the necessary data on the enemy engineering be obtained through foot patrols and expeditions or by teams delivered to the designated area by helicopter. It is emphasized that personnel of these units should be specially trained and be skilled to navigate in the jungle, observe special rules of sanitation, evaluate trafficability of the area for different times of the year, determine the possible approaches through the jungle, employ locally available material for building corridors through barriers, know the methods and means employed by the enemy in erecting obstacles, and the details of radio communications.

In the offense, engineer reconnaissance organizations can operate forward of the first echelon or with advance detachments (one or two groups, up to a squad in size). A division sends out 10-12 such groups. In the defense, they have missions to discover enemy measures in constructing engineer barriers and minefield, the preparation of probable avenues for attack, and so forth. Collection of these data is also performed by other reconnaissance organizations.

Engineer preparation of deployment areas and artillery firing positions is supposed to be accomplished with consideration of providing protection for personnel and equipment from enemy fires. During the aggressive war in Viet Nam, the principal defense for American forces was in battalion and company strong points with a system of engineer barriers, observation and combat security and use of technical equipment. In rare circumstances, defensive complexes consisting of three or four zones were established to cover important areas. Reconnaissance or security groups were deployed in the first zone, patrols in the second, combat detachments and ambushes in the third, and in the fourth, the main force. Defense of objectives (administrative centers,

military bases) included two or three defensive zones consisting of a system of company and battalion strong points.

Special attention is supposed to be given to engineer preparation of subunit strong points which should be built in passes, in mountain valleys, on the slopes of ridges, on approaches to rivers and populated areas, and in terrain which is being cultivated or is free from underbrush. Detached platoon strong points can be put in on roads and mountain passes, and company strong points in "habitable" jungle areas and approaches to rivers. The most important passes with roads through them can have several strong points built; on the approaches, in the pass itself, and on the entrance to the valley.

In strong points, it is considered advisable to develop covered firing positions, foxholes and trenches, personnel bunkers, either underground or partially underground types made of sandbags and other materials, as well as break shelters for vehicle and weapon crews. In the organization of the defense in the jungle much attention should be devoted to clearing fields of observation and fire beyond the perimeter, establishing antipersonnel minefields, barbed wire and other barriers. The foreign press notes, in this connection, that heavy cutting of the vegetation causes a camouflaging by which the enemy can easily observe the area or the location of firing positions organizations.

Covered facilities for observation, fire, protection of personnel and combat equipment should be constructed during engineering preparation of an area, forces and firing positions in depth. During the aggression in Viet Nam, the Americans made wide use of reinforced concrete sections and sandbags as well as locally-available materials. It is reported that in six months of 1969 alone, 25 million sandbags were delivered to parts of South Viet Nam. During earth moving and clearing, explosives and special delayed shaped charge, and concentrated charges were widely employed.

In certain circumstances, it was considered more advisable not to create strong points, but to establish a defense by the ambush method, with ambushes set along likely enemy avenues of approach. Fortified equipped positions for organizations in ambush positions may include, judging by experience of conducting combat in Viet Nam, careful camouflage for weapons and personnel of the blocking and warning groups, fire support and covering force. Such fortifications are not built for personnel of the attack group. Covered and camouflaged local terrain is used for their protection.

Engineer barriers in the jungle are used to limit enemy operations on favorable terrain, as well as for indirectly covering positions. A barrier system in defensive operations in the jungle includes barriers established on approach routes to the principal strong points, in front of them and inside them, on approaches to valleys and on open terrain, in front of artillery positions, in likely airmobile and airborne landing zones. It is believed that establishment of barriers, especially minefields, can increase the effectiveness of all types of fires and antitank weapons, and reduce the rate of enemy advance.

In American military specialists' opinion, the greatest effect is achieved through use of controlled directed fragmentary mines. Infantry and engineer organizations receive special training in their emplacement and employment. In areas where tank, APC and truck movement is possible, controlled landmines can be emplaced, and on adjacent terrain, antitank and antipersonnel mine fields. When time permits, boobytraps should be employed, using timing fuzes, artillery shells, bombs, and explosive charges.

Barriers in front of the forward edge of the strong point are implaced on the most likely enemy avenues of approach. As a rule, they may be small mixed mine fields which are reinforced by various non-explosive barriers, for example wire, flares, automatic warning devices, and so forth. Within the strong point, only antitank mines and non-explosive barriers are supposed to be used.

When creating tree barriers on probable avenues of enemy approach, it is useful to employ explosives, especially plastique, from which remotely-detonated charges may be fashioned and attached to tree trunks.

Barbed wire entanglements, in conjunction with the difficulty of movement in the jungle and minefields, are considered highly effective and can substantially hinder infiltration into the strong point. As the foreign press indicates, in Viet Nam, the American forces on the "MacNamara Line" alone used 200,000 bundles of barbed wire with an overall length of 80,000 km. The depth of barbed wire barriers employed for protection of strong points and bases reached 400-600 m. Usually they comprised two or three rows of wire 40-50 m deep separated by 200-300 m. Patrols were conducted in the intervals. Various techniques may be used to put in minefields including minelayers, ground systems for distributing mines (for example GEMSS), MLRS, artillery mine systems (RAAMS and ADAN), helicopters, etc.

In Western military specialists' opinion, conditions in different jungle regions may favor the use of water barriers and flooded areas. Not just waterways and dikes should be destroyed to do this, and other water-related construction, but also to cause precipitation in the form of rain. During the aggression in Viet Nam, American forces destroyed seven major dikes and several km of levees. In particular, dikes along the Mekong River delta were destroyed causing a large flooded region and the dampened soil in this area became practically unusable by troops. Destruction of hydraulic facilities was employed several times during the U.S. aggression in Korea, also.

Artificial rainmaking is accomplished by seeding clouds with iodized silver and lead, as well as other elements. Artificial rainmaking can raise the water level in rivers and create flooded zones. For example, in 1971, in Viet Nam as a result of American rainmaking, the level of water in the Red River was raised by 13.5 m over its low level and created a huge water barrier.

An important place in the general system of engineer support in the jungle should be given to locating and clearing mines, and clearing corridors through other barriers. Statistics show that American forces in the Viet Nam aggression suffered many casualties from antipersonnel mines and booby traps. For example, 30 percent of all of the casualties suffered by the 1st Infantry Division was from mines. Therefore, the army attaches great significance to

developing and employing effective location of mines and explosives. At this time, according to the Western press, army engineer organizations have the AN/PRS-7 and -8, and AN/PSS-11 portable mine sweepers, which enable them to find practically all types of mines. It is also reported that a minesweeping system mounted on jeeps and helicopters (METRRA) is being developed which is supposed to locate mines on roads and clearings as well as ammo and demolition dumps in forests. Specially trained dogs can be used for finding mines and ammunition. Special formations were created for this training by the U.S. for Viet Nam. The Americans also used such measures as paving road beds with an asphalt mixture with a special machine. This made it possible to determine when mines had been emplaced on the road.

In Western military specialists' opinion, the equipment used to clear corridors through barriers depends, to a large extent, on the local conditions. Barriers placed on open terrain and in valleys require mine clearing explosives with remote control (type M173 and M157) or missile mine clearers (SLUFAE). On mountain slopes the SLUFAE missile or the helicopter system (FAE-SHED) are required. Corridors through antipersonnel barriers may be cleared with remotely-controlled charges using M1A1 det-cord, and, in some cases, rope mine clearing devices or hand-placed explosive charges.

The American Army considers the building of roads, highways, paths, and so on, to be some of the engineer support missions in the jungle. In their opinion, this will be a very difficult task since the road net will be poorly developed and, as a rule, the enemy will attempt to render the few existing roads useless. Nevertheless this mission is considered no less important than overcoming various types of barriers.

To build roads in the jungle it is recommended that existing roads and paths be used and that new roads be laid only in remote regions. The destruction of roads and the great difficulties which accompany their rebuilding require assignment of a larger force than normal to build and maintain roads as well as to perform specialized measures to prevent their destruction (security and defense of the most important road segments, patrols, etc.)

It is reported in the foreign military press that the basic forms of road work will be clearing growth or abatis, building detours, bridges and approaches to them, and restoring destroyed sections. To reinforce sections of roads built on soft soil, it is recommended that a flexible paving be used.

When organizing the improvement of roads in the jungle it is necessary to bear in mind that they traverse vegetation which quickly grows back (especially bamboo), and, consequently, demands periodic clearing. Securing roads is accomplished by patrols, ambushes and permanent posts in areas where enemy activity is possible. In jungle conditions, it is also necessary to plan for measures to prevent damage to roads by a retreating enemy. For this it is recommended to seize such sections of road which would be difficult to rebuild and for which preparation of bypasses would be complicated. The mission to seize such road sections would fall to helicopterborne or foot mobile organizations.

The American Army believes that carrying out engineer support of combat forces under these special conditions will largely be determined by the personnel training in engineer and other organizations. As seen in the foreign press, at this time this issue continues to receive a great deal of attention. Separate engineer support missions are part of combat training and various types of concurrent instruction are conducted in areas with similar geographics to the jungle (Honduras and El Salvador). Practical measures were carried out by the American warmongers during the bandit attack on Grenada.

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FOREIGN MILITARY REVIEW

GROUND FORCES' DRONES

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 4, Apr 86 (Signed to press 7 Apr 86) pp 25-32

[Article by Col I. Karenin; "Ground Force Drones"]

[Text] It would seem, after several years of almost total oblivion, the foreign press, in its publications, has again recently started paying increased attention to various kinds of pilotless aircraft [drones], whose successful practical use was furthered in Israel's aggressive combat activities against Lebanon in 1982. In analyzing the Israeli experience, NATO specialists came to the conclusion that drones may be relied upon to execute several NATO missions under modern air defense conditions where piloted aircraft has become increasingly vulnerable. In the final analysis, it allows one to avoid exposing air crews to unwarranted risk and to preserve costly military equipment. This last factor definitely implies that drones cost considerably less than piloted planes and helicopters. It also points out that drones, neither now nor in the future, will replace piloted aircraft, but will only supplement them; they will strengthen the ability to perform specific kinds of missions, and will also provide a more effective use of new means of conducting armed combat (for example, target designation for rocket salvo fire systems).

In Western military specialists' opinion, drones, insofar as the army is concerned, are capable of conducting air reconnaissance to detect mobile and stationary ground targets (tank and mechanized columns, missile and artillery firing positions command centers, depots, anti-aircraft defenses, temporary airfields, etc.) and determining their coordinates. They can perform target designation and make corrections when firing barreled artillery and salvo fire systems. They can illuminate targets with a laser beam for their subsequent destruction by guided artillery projectiles with a laser guidance system (Copperhead-type). They can relay radio signals and provide a precise evaluation of previously-inflicted damage. They can search and destroy separate targets using onboard weapons, etc. Schematic depictions of the possible variants of the flight path of a drones in performing some of the missions just listed are presented in Figs. 1 and 2.

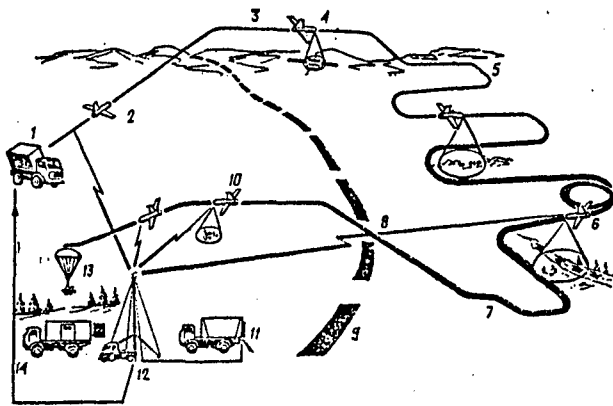


Figure 1. Schematic of a Drone on Reconnaissance of Mobile Ground Targets (Variant)

1. Take-off from ground launcher; 2. Climb in altitude at a speed of 160 km/hr; 3. Flight at about 2,000 m altitude at a speed of 220 km/hr; 4. and 10. Clarification of navigation data; 5. search for targets (flight time, more than 2 hrs, altitude, 500-2,000 m, speed 150 km/hr); 6. Intercept, tracking, and recognition of targets; 7. Flight path on return route at an altitude of about 2,000 m and at a speed of 220 km/hr; 8. Transmission line for reconnoitered data; 9. Front line; 11. Control center; 12. Reception and processing point of reconnoitered data; 13. Landing of drone after completion of mission; 14. Post-flight servicing and preparation of aircraft for repeat take-off.

At the present time, the foreign press lacks a common and precise classification for drones even though individual efforts have been made to do so. Specifically, drones are usually subdivided according to various criteria:

- As a function of the guidance system they use; by executing the flight on the basis of a program or radio commands (the latter are frequently called remote-piloted or remote-control aircraft). It is held that the range of operations of a radio-command guidance system is considerably less than for aircraft which operate by program, since the guidance is done, as a rule, in the ultra-shortwave range and depends upon the range of direct visibility.

- According to take-off (launch) weight and dimensions; as small-sized (sometimes they are also called miniatures), medium-sized, and large-sized. Judging from reports in the foreign press, Western specialists are devoting major efforts to developing small-sized drones, which, by their weight and dimensions, are comparable to radio-guided model airplanes and helicopters. Various modifications of the AQM-34 drone, based on the American FIREBEE guided aerial target, fall into the category of medium-sized devices. The Pentagon used them rather widely in the U.S.'s aggressive war in Indochina (it was reported, for example, that these aircraft made about 3,400 flights, including reconnaissance missions, passive jamming and ELINT suppression). The Western press includes in the category of large-sized drones those high-altitude, long-range aircraft which underwent flight testing in the mid-1970s in the U.S. in the COMPASS COPE program.

- According to the mission to be accomplished; reconnaissance, electronic warfare, and multipurpose drones capable of, for example, simultaneously illuminating targets, upon detection, with a laser beam or even destroying them with on-board weaponry, (the latter aircraft can be single- or multi-purpose).

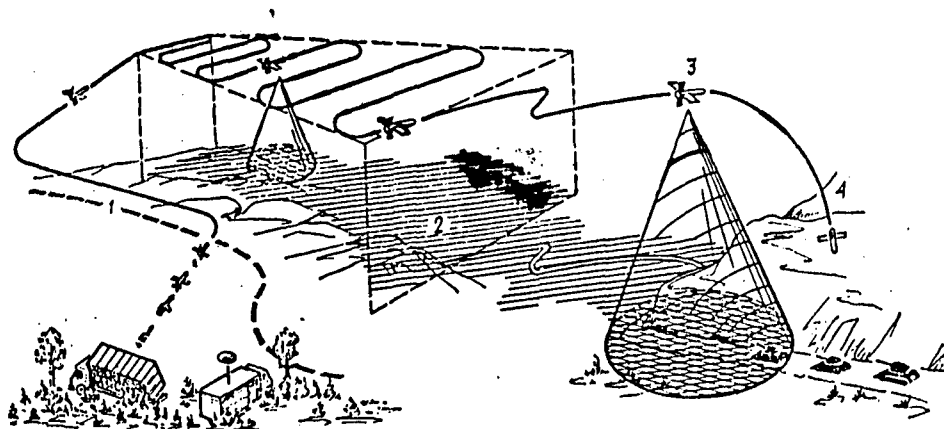


Figure 2. Diagram of a Drone Sent Out to Search and Destroy a Detected Target (Variant)

1. Front lines; 2. Search Area (search time exceeds 3 hours); 3. Detection and Recognition of the Target; 4. Diving attack on the Target.

Drones use aircraft piston or turbojet engines as a power source and in their launch (take-off) from the ground they use detachable powder boosters. Upon returning from their mission, drones are recovered by their descending by a parachute or catching them at the end of their glide path by lowering a special net. Sometimes they make a landing with landing gear. The make-up of the on-board equipment depends chiefly upon the aircraft's mission: for reconnaissance missions they use aerial cameras, television cameras, infrared sets, or ELINT reconnaissance equipment. For electronic warfare, they can also carry on board active jamming equipment and devices to eject anti-radar reflectors [chaff].

The foreign press notes that although, in the last several decades, development on various kinds of drones has been carried out in the West in a number of programs, such aircraft at the present time are in service in the armies of a limited number of states.

How can this be explained? In NATO experts' opinion, there are subjective and objective reasons which hamper the broad use of drones in the armed forces of the nation participants of the bloc. One of the primary subjective factors

includes the conservatism of the military leadership' views, which is basically oriented toward using piloted assets to execute the missions enumerated above. Among the objective reasons are the difficulty in controlling the flight of drones and maintaining communications with them under modern conditions, where the air space is practically saturated to overflowing with aircraft of various kinds (planes, helicopters, missiles).

Information is presented below on current in-service drones (their features are shown in the table), as well as a survey made of the work being carried out by the major NATO countries to create new drones.

PRIMARY TACTICAL-TECHNICAL CHARACTERISTICS OF DRONES
IN SERVICE IN FOREIGN GROUND FORCES

Name, Designation, Developing Country	Weight, kg	Maximum	Maximum	Dimensions, m:	Reconnaissance Equipment
	Maximum	Flight	Flight	Length and	
	Take-off	Speed,	Range, km	Height	
		km/hr.	(radius)		
	Pay load	Service	Maximum	Wing span	
		Ceiling, m	Flight Duration, hr.		
EPERIOT, Belgium	142	500	90 (.)	2.38 X 0.92	Aerial Camera, Linear-Scanning IR Unit
	20	4,000	25 min	1.72	
AN/USD-501 (CL-89), UK, Canada, FRG	156	740	120 (45)	2.6 X 0.33	Aerial Camera or Linear-Scanning IR unit
	15	3,000	8 min	0.94	
R20, France	850	790	(160)	5.71 x .	Aerial Camera and CYCLOW IR unit
	150	10,000	--	3.72	
MASTIF-3, Israel	111	180	200 (.)	3.3 x 0.89	Television Camera and Aerial Camera
	30	3,000	7.5	4.25	

Since 1976, the Belgian army has been using the idigenously-developed EPERIOT drone for combat training. It is equipped with a CT3201 turbojet engine built by Lucas with a thrust of 52 pounds. The fuel (25 kg) is stored in the wings and in the fuselage. The aircraft is launched from a mobile launcher with the help of a launching booster. Landing after the mission is completed is by parachute. A ground mobile unit controls the flight path of the EPERIOT by program or by radio command. The on-board reconnaissance requipment includes various kinds of aerial cameras and a linear-scanning infrared unit, which permits the transmission of acquired information to the control point on a real-time basis.

The armies of Great Britain, Canada, Italy, France and the FRG have in service a pilotless reconaissance system with the NATO designation of AN/USD-501 (it frequently also has another designator--CL-89). It was developed by three of

the bloc's participant nations (Great Britain, Canada, FRG) taking into account their jointly-developed requirements for pilotless reconnaissance. The key requirements are: the ability to operate under conditions of strong enemy anti-aircraft defense, to spot and register targets at tactical depth, and to deliver received information in the shortest time period. The AN/USD-501 system consists of a drone, and a mobile ground complex that flies and performs technical maintenance on them. The aircraft is a returnable guided missile built like a DUCK. The sustainer motor on it is a Williams Research WR2-6 turbojet engine with a thrust of 55 kg. Take-off is done from a ground launcher assisted by a launching booster with a thrust of 2,000 kg which is detached in flight.

The aircraft's flight path is controlled by a special program that is inserted into an on-board device before launching. During the final leg of the flight path upon return from a mission, the aircraft is guided by radio command to a homing beacon where it is landed by parachute and with two inflatable shock absorbers. Depending upon flying conditions and the missions to be performed by the aircraft, it can be mounted with an aerial camera or a linear infrared scanning unit. Twelve cartridges mounted on board are used for night photography.

Judging from reports in the Western press, the Canadian firm of Canadair has produced 600 drones since the AN/USD-501 was put into service in 1972. It is intended that these aircraft will be produced and used right into the 1990s.

Besides the CL-89, the French Army also has indigenously developed the R.20 pilotless observation aircraft. This aircraft is equipped with a single MARBORIET-2D turbojet engine with a thrust of 400 kg. It takes off from a ground mobile launcher assisted by two boosters. The flight is controlled by radio command and program. On-board reconnaissance equipment includes aerial cameras and a CYCLON infrared unit housed in the nose of the fuselage and in suspended containers hung under the ends of the wings. It is reported that during a single flight at low altitudes, using three aerial cameras, territory with an area of about 200 km² can be photographed.

According to reports in the Western press, the only foreign drones to have undergone a thorough verification of their capabilities under combat conditions are the MASTIFF and SCOUT which Israeli commanders widely used in the 1982 aggression against Lebanon. The former is in service in the Israeli Army and the latter is in its Air Force. A recent modification of the MASTIFF--the MASTIFF 3--is equipped with a 22 horsepower piston engine and pusher propeller. The aircraft can be launched from any ground launcher using a catapult or from the ground with the assistance of the simplest kind of tricycle landing gear. Landing is done on a special field equipped with arresting gear whose steel cable latches onto the braking hook of the aircraft upon landing. Aircraft on-board equipment includes a reconnaissance television camera with a real-time information transmission device.

Since 1984, the U.S. has been troop testing the R4E-40 SKYEYE drone under conditions which approximate those in combat as nearly as possible. To this end, as witnessed in the foreign press, the Pentagon has deployed a squadron of these aircraft in Honduras and is actively using them to gather reconnaissance information in the border regions of Nicaragua, in brazen violation of the sovereignty of an independent state.

A squadron contains as many as 14 SKYEYE aircraft, a mobile launcher and control center, a trailer with an antenna to track the aircraft and to transmit radio commands to it, two diesel electric generators (one of them as a spare), and a device to receive and process reconnaissance information. The service personnel who deal directly with the combat deployment of the aircraft include the squadron commander, the aircraft flight leader, two remote control operators (one controls the aircraft itself by issuing it the appropriate radio commands and the other deals with the on-board reconnaissance equipment), an electronics technician and a mechanic.

The SKYEYE is equipped with a two cylinder, two-stroke 38 hp engine with a pusher propeller with a diameter of approximately 0.8 m. The airframe of the aircraft (length, 4.2 m; wing span, 5.33 m) is made completely of composite materials. The maximum take-off weight of the device is 240 kg, its maximum speed about 250 km/hr, and service ceiling 5,500 m. With a standard supply of fuel (45 kg), the aircraft is capable of completing a flight of almost over 9 hours at an altitude of 900 m and at a cruising speed of about 130 km/hr. In tests it has used various types of reconnaissance equipment: an ordinary television camera and one which operates at low light levels, a forward-looking infrared unit, and a 35-mm panoramic aerial camera. It has been reported, in particular, that the television camera has made it possible to detect a tank at ranges greater than 6,000 m and a jeep vehicle at 3,200 m.

In American military specialists' opinion, experience obtained in the process of testing the SKYEYE reconnaissance drones will make it possible in the future, with fewer outlays in training servicing personnel, to engage in deploying the more complex AQUILA multipurpose aircraft, ordered for development by the U. S. Army from Lockheed. This drone is intended not only to conduct reconnaissance, but also to do target designation, including the laser illumination of targets. Connected with this, the aircraft will carry expensive and complex equipment (a television camera or forward-looking infrared unit, a laser range finder and target designator, etc.) controlled by an on-board computer. The AQUILA is equipped with a 26 hp piston engine, a pusher propeller (diameter, 0.66 m) located in a ring duct. The aircraft takes off from a ground launcher and after returning from a mission is caught by a special net strung up in the final segment of the landing trajectory. The basic features of the aircraft are: length, 2.1 m; wing span, 3.9 m; maximum launch weight, 120 kg; service load, about 30 kg; cruising speed, 135-170 km/hr; service ceiling, 4,300 m; flight time, 3 hours. The U.S. Army command initially intends to acquire more than 540 AQUILA drones and 80 mobile command posts. It is anticipated that this aircraft will be put in service at the end of the 1980s.

In Great Britain, the army has ordered the development and flight testing of the PHOENIX drones, intended for battlefield reconnaissance. The aircraft has

a modular design and is equipped with a 28 hp engine. The aircraft is launched with the assistance of a pneumatic catapult, and landing is by parachute. The basic on-board reconnaissance equipment is a television camera suspended in a container under the fuselage. Mass production of the PHOENIX is scheduled to commence in the late 1980s, and the British army intends to acquire about 200 of these aircraft.

In the FRG, judging from reports in the Western press, starting in the mid-1970s, various firms have been carrying out research on drones in accordance with several specific programs. One of them is looking at the creation of a KZO (Kleinfluggeraet fuer Zielortung) -- a small-sized device to determine the location of targets and to issue target designations when firing a salvo fire rocket system. Messerschmitt-Boelkow-Blom (MBB) and Dornier are participating in this program on a competitive basis.

MBB intends to build a KZO based on the experimental TOUCAN drone, which was flight tested in 1979. The TOUCAN (weight, 140 kg; length, 2.06 m; wing span, 3.3 m) is equipped with an 11 hp piston engine and a pusher propellor. The aircraft is launched with the aid of a powder booster from a transportable container which also serves as the launcher, or from a ground launcher. After completing a flight, the device lands by parachute. The aircraft is controlled either by program or radio command from a control center. Flight tests evaluated the possibility of using various kinds of on-board equipment, including television cameras and forward-looking infrared units.

Along with developing reconnaissance drones, the FRG is also carrying out RTD&E work to create a so-called single-use pilotless means of attack, in particular, anti-tank PADS (Panzer Abwehr Drohne) and anti-radar KDAR (Kleindrohne Antiradar). They are intended to search out, detect, and subsequently destroy their respective targets located at distances of up to 200 km from the FEBA. The flight path of such drones intending to search out an area will occur according to programs previously inputted into the on-board equipment. Furthermore, the device will perform an independent search, detection and interception of a target and will be guided towards it by means of an on-board homing head. It will then inflict damage with a built-in warhead. The flight time of such aircraft in the search area, in West German specialists' opinion, should take no less than three hours.

In Canada in 1977, the Canadair firm developed a pilotless helicopter-like device, the CL-227, which was flight tested in 1980. The CL-227 has a fiberglass body of modular design. The upper spherical module houses the flight control system, the center holds the gas turbine engine that turns two co-axial propellers made out of Kevlar with diameters of 2.57 m. The lower module contains the on-board reconnaissance equipment. The take-off weight of the device is 154 kg, its height is 1.64 m, and the maximum diameter of the spherical modules is 0.64 m. It is capable of flying at a maximum speed of 130 km/hr at altitudes up to 3000 m. It is considered that even though the CL-227 has a somewhat smaller flight range than drones with airplane-like configurations, it does not need specially-prepared sites for take-off and landing, hence, its reconnaissance systems, which contain identical equipment to other aircraft, can be deployed even in lightly wooded clearings.

Along with the CL-227, the Canadian firm of Canadair, in conjunction with the West German Dornier and French SAT, has created an improved variant of the CL-89 pilotless reconnaissance aircraft, which has been designated the CL-289 (in NATO, the AN/USD-502). Judging from reports in the foreign press, the CL-289 has a significantly greater range (with an operating radius of 150 to 170 km) than the CL-89. The FRG Army intends to use it to gather intelligence information on enemy troops operating in the army corps zone of responsibility as well as supply data when firing long-range artillery and delivering air strikes. Equipment on-board the CL-289 includes an aerial camera and a lateral-scanning infrared unit plus a device to transmit real-time data. The flight is program-controlled. The Bundeswehr command intends to acquire about 200 CL-289s and put them into service in the late 1980s.

In Italy, the specialized firm of Metero is involved with questions dealing with drone development and production. One of their latest models--the MIRACH-20--was recently demonstrated on the proving grounds on the island of Sardinia in the presence of Italian armed forces representatives. The MIRACH-20 is a small-sized device (length, 3.6 m; wing span, 3.8 m; launch weight, 150 kg; and a service load of 25 kg) equipped with a piston engine and a pusher propeller. It takes off from a ground launcher with the aid of a powder booster that ejects immediately after launching. According to foreign press reports, it is anticipated that the MIRACH-20 will shortly undergo mass production as a tactical reconnaissance asset for the Italian Army.

It is also reported that development is underway on several families of MIRACHES. Thus, the MIRACH-70, which has almost the same dimensions as the MIRACH-20, but of greater weight (about 260 kg), is intended to be used chiefly as a guided flying target; however, it may also be used to conduct electronic warfare.

The MIRACH-100 reconnaissance device (length, 3.9 meters; wing span, 1.8 meters; launch weight, 310 kg, payload, 40 kg) is equipped with a turbojet engine and can be launched from either a ground launcher or an A.109 helicopter.

At the present time, based on Western press evidence, efforts are being made abroad to coordinate work connected with drone development since foreign military specialists believe that their individual development by various countries and firms, in addition to causing an improper expenditure of significant material efforts and resources, has frequently resulted in practically analogous designs and combat specifications for these aircraft. In particular, at a conference on drones, held in Great Britain in 1985, wherein more than 200 delegates from 16 capitalist nations took part, an official NATO representative formulated the jointly-developed bloc requirements for future pilotless assets based to their anticipated combat use. In accordance with these requirements, it was considered advisable to focus primary attention on developing three types of drones:

- So-called medium operating radius reconnaissance devices with a take-off weight on the order of 150 kg, a flight time of 2-4 hours, and a cruising speed of about 180 km/hr. The equipment it ought to carry on board should include a television, thermalvision, and radar devices (or a combination

thereof) and should have the ability to transmit real-time information. Furthermore, in keeping with the bloc's new concept which has been termed "Enemy second echelon (reserve) combat," it has been deemed useful to create a pilotless reconnaissance aircraft with a large operating radius (about 500 km) capable of flying at high subsonic speeds.

- Devices to suppress the enemy's anti-aircraft defenses (two variants: one with an electronics suppression device and an anti-radar one that provides an independent search, detection and destruction of radio wave-emitting targets). The primary missions of such drones is to render assistance to piloted aircraft in overcoming modern enemy anti-aircraft defense systems.

- Anti-tank devices used to accomplish missions for isolating the region of combat activities.

Everything presented above is evidence that the aggressive North Atlantic bloc, in carrying out an arms race, besides creating and improving highly accurate conventional and nuclear missile weaponry, is conducting research into new means of supporting combat activities, in which Western military experts include drones. In developing them, they use recent achievements in science and technology from the most diverse fields, including radio electronics, engine construction, and construction materials.

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FOREIGN MILITARY REVIEW

THE NETHERLANDS' AIR FORCES

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 4, Apr 86 (Signed to press 7 Apr 86) pp 33-40

[Article by Col P. Shiryaev, "The Netherlands' Air Forces"]

[Text] The Netherlands' military-political leadership considers the active participation in the aggressive NATO bloc and the world-wide increase in its military power, for the purpose of achieving superiority over the USSR and other Warsaw Pact countries, to be the basis of its military policy. Representatives of NATO countries express complete support of American initiatives, directed at building up the strike power of the bloc's allied armed forces. For example, in spite of the will of its people, the Netherlands' government decided to begin deployment of American ground-launched cruise missiles (KR) [CMs] on its territory. In all, the Pentagon intends to deploy 48 such missiles there, three detachments of four launchers (four CMs on each launcher).

The Netherlands participates in the work of a majority of NATO political and military organs. Military contribution follows the path of joint operational planning, participation in the unified PVO system, putting Dutch at troops the disposal of the bloc's command, joint development and production of new types of weapons and military equipment, participation in allied armed forces' exercises, etc. The country's government strictly executes the decisions of the North Atlantic Union's leadership concerning the further development of the national armed forces according to NATO's long-term program, and above all, their being equipped with new types of armament. Therefore, the main attention is being paid to the construction of the air force, which is an integral part of NATO's Allied Air Force in the Central European TVD.

The Netherlands' Air Force is an independent branch of the armed forces. Presently, as the foreign press reports, it numbers approximately 20,000 men (more than 13,000 cadre servicemen, 4,000 contract personnel and 3,000 civilians), more than 170 combat and 12 military-transport aircraft, and more than 90 special-purpose helicopters.

MISSIONS, ORGANIZATION AND COMBAT COMPOSITION. As the foreign press has reported, the Netherlands' Air Force, being an integral part of 2nd OTAK [ATAF], is intended to execute the following missions jointly with the

formations, units and subunits of the air forces of the U.S., Great Britain, the FRG, and Belgium, which belong to it: deliver strikes, including nuclear ones, on enemy targets in the tactical and operational-tactical depths; render air support to the ground troops and the navy; protect large administrative centers, important industrial targets and troop groupings from enemy air strikes; conduct tactical air reconnaissance; and to airlift troops and combat equipment.

Special missions are entrusted to the Dutch Air Force during a threat period, when numerous transports of troop reinforcements from the U.S. and Canada to the European theater of war are expected.

In this connection, the Netherlands' Air Force command, even in peacetime, must maintain airfields designated to receive American reinforcement squadrons in constant combat readiness and has created the necessary reserves of MTO [material-technical support] resources at them. In addition, it executes the missions of protecting transports and regions for storing MTO resources, and provides navigation and air control in its air space and on the approaches to it. The execution of these missions is secured in appropriate bilateral and multilateral agreements and accords with the governments participating in NATO.

The air force's chief of the main staff (commander), who is directly subordinate to the minister of defense, carries out the air force's leadership. He is responsible for training the formations, units and subunits to conduct combat operations according to the plans of the country's armed forces commander and the NATO command and, through the main air force staff, he controls the speed of execution of the programs for organizing the air force and equipping it with new aviation equipment; carries out measures for maintaining their combat readiness; and plans mobilization deployment during a threat period.

For solving issues dealing with the air force's future construction and development, a higher collective advisory organ, the air force's military council, was created. It includes the minister of defense (the chairman), his deputy, the armed forces inspector general and several other high-ranking military persons, and also the air force's chief of the main staff, and directorate chiefs of this staff.

The main staff (located at the Hague) is the air force's operational control organ and consists of the planning, operations, organizations and combat training, reconnaissance, the rear, financial and automation departments. It is busy with working out the plans for the organization, operational employment, and combat training of the air force's formations and units, and with the issues regarding the organization of reconnaissance, etc. The Tactical Air Command (TAK) [TAC], the MTO and Troop Training Command (MTO and TC) [Logistics and Training Command], the MTO's directorates and staff, and also other organizations and services are subordinate to the headquarters (Fig. 1).

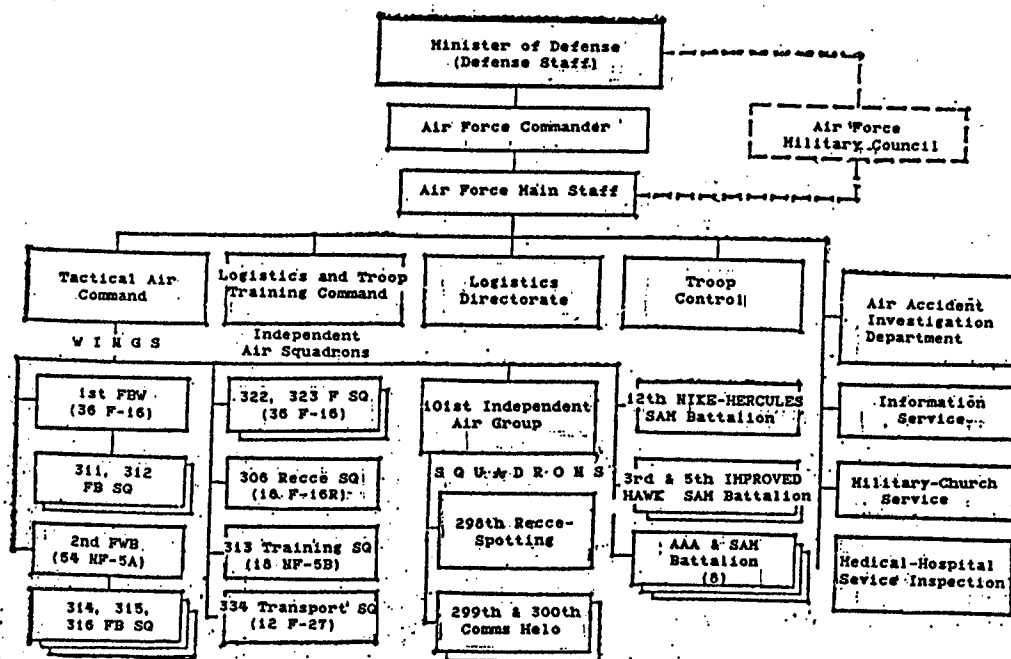


Figure 1. Organization of the Netherlands' Air Forces

The Netherlands' Air Force command, airfield network, combat training and future development are discussed below, based on information published in the foreign press.

The Tactical Air Command (headquartered at Zeist) includes the following main forces and resources of the country's air force: two tactical fighter-bomber wings (the 1st and the 2nd FBW, five independent air squadrons, the 101st Independent Air Group (auxiliary designation) and air defense resources.

The air wing is the basic tactical air force unit and is comprised of two-three squadrons. Only the flight personnel and combat aircraft are counted in the wing's TO&E. All supporting and service subunits are assigned to airbases.

The air squadron is a tactical subunit. It can conduct combat operations both in a wing, and independently. Eighteen aircraft are in the inventory of one squadron.

The 1st FBW is located at Volkel airbase. It includes the 311th and 312th squadrons (each with 18 F-16 fighter-bombers).

The 2nd FBW consists of three squadrons-- the 314th, the 315th and the 316th, each with 18 NF-5A aircraft), which are deployed at Eindhoven, Twente, and Gilze-Rijen airbases respectively.

As was mentioned above, TAC includes five independent air squadrons: the 322nd and the 323rd Fighter Squadrons (36 F-16s, Leeuwarden airbase), the 306th Reconnaissance Squadron (18 F-16Rs, Volkel), the 313th Combat-Training Squadron (18 NF-5B, Twente) and the 334th Transport Squadron (12 F-27s, Soesterberg).

The auxiliary-purpose 101st Independent Air Group (operationally subordinated to the 1st Army Corps) includes: the 298th Reconnaissance-Spotting Squadron (Soesterberg), and the 299th and 300th Helicopter Communications Squadrons (both located at Deelen airbase). In all, the group numbers more than 90 ALOUETTE-3 and BO-105 helicopters. The air defense resources are contained in independent air defense battalions (SAM Bn, three in all) and air defense missile-artillery batteries (SAM Btry, eight). To the first belong: the 12th NIKE-HERCULES SAM Battalion (it has three batteries: the 118th, the 220th, and the 223rd, with nine launchers in each), the 3rd IMPROVED HAWK SAM Battalion (the 324th, 325th, and 327th batteries with six launchers) and the 5th IMPROVED HAWK SAM Battalion (the 500th, 501st, 502nd, and 503rd batteries with six launchers). They are all deployed on FRG territory. Their headquarters are located at Ferden, Blomberg, and Stolzenau respectively.

The independent air defense missile-artillery batteries are located on the country's territory, in particular: at Leeuwarden, Gilze-Rijen, Soesterberg, Twente, Volkel, Deelen, Eindhoven, and Ypenberg. In each battery there are three IMPROVED HAWK launchers and three 40-mm L70 BOFORS antiaircraft guns.

The Netherlands' PVO personnel and resources are organizationally included in NATO's Central Air Defense Zone and comprise part of the 1st Sector of 2ATAF's air defense region. The zone's operations center is located in Brunsum, and that of the region at Maastrich. In addition, the control and reporting center (CRC) (at Nieuw-Milligen, 9 km west of Apeldoorn), and also a control and reporting point (CRP) in Den Helder, 60 km north of Amsterdam) are located on the country's territory.

A CRC accomplishes the detection, warning and tracking of air targets, directs fighters to them, collects and transmits information on the air situation to the sector and regional PVO operational centers. It is equipped with the TH.D 1955, ER-438 and SGR-109 radars with a target detection range up to 360 km.

The RP organizes the collection of information on the air situation and its transmission to the CRC. It includes the AN/FPS-88, EP-438 and SGR-109 radars.

As is reported in the foreign press, in 1984, the equipping of the CRC and the RP was complemented with NATO's long-range detection and control [airborne warning and control] system. This, according to foreign specialists' opinions, significantly increased their capabilities to track the air situation and vector the air force's fighters and air defense missiles.

Judging by Western press reports, the U.S. Air Force's 32nd Tactical Air Squadron, located at Soesterberg airbase (24 F-15 EAGLE aircraft) is operationally subordinate to the Dutch CRC. Fighter-bomber attack aircraft are also used to execute PVO missions.

The Logistics and Troop Training Command (Fig. 2) deals with issues concerning the air force's material-technical support and troop training.

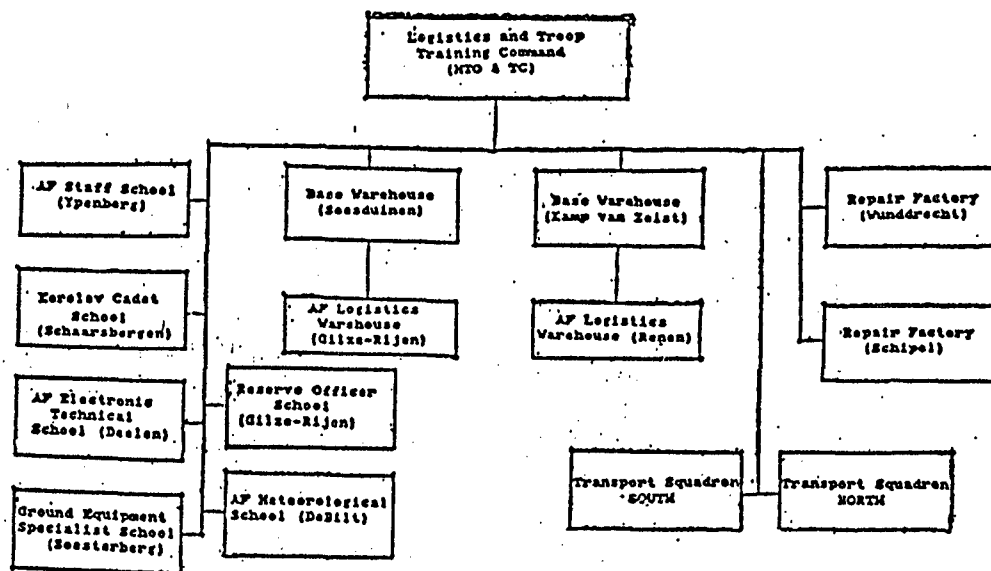


Figure 2. Logistics and Troop Training Command Organization

Besides this command, the Logistics Directorate, which is concerned with the general planning for the purchasing of new and the modernization of existing aviation equipment, is responsible for Air Force material-technical support. The carrying out of practical measures for the supply of air force units, services and directorates is entrusted to the command. It works out specific plans for the material-technical support of air force combat and auxiliary units; creates the stored reserves of equipment and materiel resources; organizes their prolonged storage; determines requirements; and carries out the regular operations and the repair of aviation equipment and armament, and also trains the necessary number of aviation specialists.

Direct technical servicing (pre-flight preparation and post-flight inspection) and the preventative maintenance of aviation equipment is carried out by technical subunits, which are an integral part of an airbase's standard structure. The capital repair of aircraft and armament is organized at specialized repair factories in Wunsdrecht and Schiphof and also at the industrial enterprises of firms (by contract).

The MTO resources, allocated for the Air Force, are stored at two base warehouses (in Soestduinen and Kamp van Zeist), and then distributed between air force warehouses (at Gilze-Rijen and Renen) and airfield warehouses. Two transport squadrons, the "Northern" (Kamp van Zeist) and the "Southern" (Gilze-Rijen) deliver the cargo to the airbases.

Western military reviewers consider, that a significant reserve of weapons is currently located at the country's air force warehouses, and includes: up to 1,200 conventional (Mk82 and Mk82K) and more than 900 napalm (BLU-27B) air bombs, almost 4,000 bomb cassettes (Mk20 and BL-755), more than 23,000 70-mm HAR, up to 700 "air-to-air" guided missiles, and also approximately 100 NIKE-HERCULES and 360 IMPROVED HAWK SAMs.

To train cadres, the command has the following training institutions at its disposal.

The Air Force Staff School (Ypenberg) trains senior officers for work in staff positions in Air Force commands and units. Officers of the rank of major, are accepted to the school, and the course of study is two years.

The Korolev Cadet School (Schaarsbergen). Non-commissioned officers are trained at it for specialties in electronic aviation equipment, radio and radar equipment, flight control, communications, aviation armament, and also specialists for various services (the rear, administration, etc.).

The Air Force's Electronic-Technical School (Deelen) trains specialists in the operations of the missile equipment in NIKE-HERCULES and IMPROVED HAWK battalions, and also drivers for the Air Force's motor transport service.

The Ground Weapons Specialist School (Soesterberg) turns out specialists for servicing motor and tractor vehicles and other equipment.

The Air Force's Meteorological School (De Bilt) trains weathermen and other specialists of the weather service for air force units and subunits.

The Reserve Officers School (Gilze-Rijen) trains reserve officers for the Air Forces mobilization deployment.

The training of the Air Force's cadre officers, and also for the ground forces and the navy is accomplished at an academy (during a period of 4-5 years). Persons 17-24 years of age, whose health is satisfactory for service in the air force, and have a middle or middle-technical education are admitted.

Officer flight training begins with familiarization flights on trainer aircraft. Their further training is continued in Canada. 60 persons are selected each year for this training. They pass through a complete training course there, comprised of three phases: beginning training (three months), main training (nine months) and advanced training (five months).

Initial training is conducted at Portage airbase on CT-114 light propeller aircraft (the average flight time for one trainee is 30 hours). The main training (CT-114 aircraft, 200 hours) is carried out at Moose Jaw airbase, and advanced (CF-5D jet aircraft, 100 hours) is carried out at Cold Lake airbase. After completing training in Canada, the pilots return to the Netherlands and continue flight training for five months; at first in the 313th Combat-Training Squadron on NF-5B aircraft, and then at one of the combat squadrons of the 2nd Fighter-Bomber Wing on NF-5As. Pilots, having a general flight time

on all types of aircraft of not less than 500 hours, are sent for retraining on the F-16.

Helicopter crews are trained in NATO special courses at Fort Rucker (U.S.). Over a course of 30 weeks, they train on TH-55 and UH-1 helicopters along with pilots from the FRG, Denmark, and Norway, and upon returning, they train on the ALOUETTE-3 in a combat-training detachment of the 300th Communications Helicopter Squadron.

THE AIRFIELD NETWORK. As it was noted in the foreign press, there are more than 20 airfields on the Netherlands' territory, of which 15 can be used for basing combat aviation. Thirteen of them are equipped as first and second class (airfields) (by NATO standards) and have a 3,000 m-long runway, a 1,500-2,000 m-long reserve runway, taxi ways, group and individual aircraft hardstands, hangars, technical buildings, and ammunition and POL warehouses. All these airfields are placed at the disposal of the NATO command.

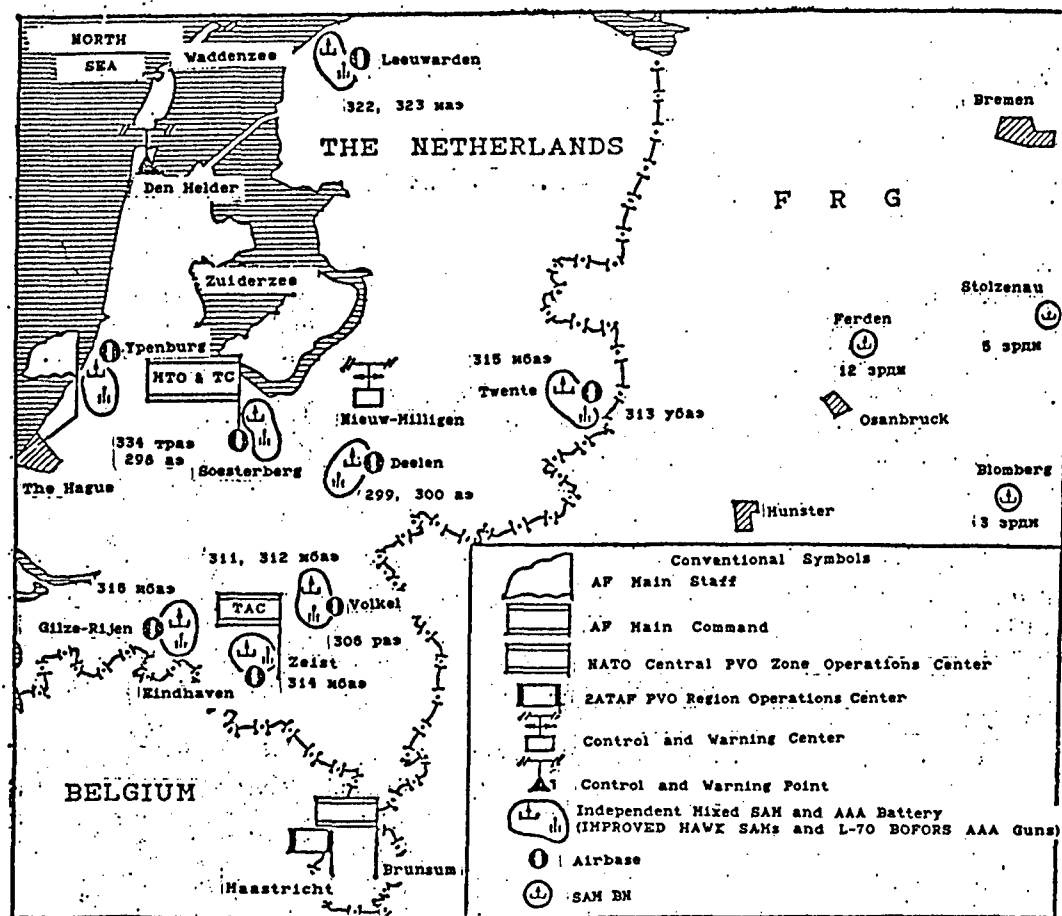
The airfields for basing combat aircraft are equipped with stationary radio and lighting equipment, allowing day or night take-off and landing of aircraft in good or bad weather. The most modern equipment is set up at Volkel, Soesterberg, Leeuwarden, Twente and Eindhoven. Warehouses for storing nuclear ammunition are located at the first two. For protecting combat aircraft from air strikes, approximately 200 reinforced-concrete arched shelters are constructed at 7 air bases. The location of the main units and subunits, and also the control organs of the Netherlands' Air Force are shown in Figure 5.

COMBAT TRAINING of air force units and subunits is carried out according to the plans of both the country's air force command and NATO's military leadership. The organization and conduct of daily combat training activities is considered to be primary. The working out of the issues of the combat employment of large aviation groupings is accomplished during the course of NATO's Allied Air Force exercises in Europe. As it is noted in the foreign press, during operational and combat training, much importance is attached to the development of air force employment principles, such as the massing of forces on main axes, the working out of issues regarding the organization of close cooperation with other branches of the armed forces, the providing of continuous and close control of crews on the ground and in the air.

According to the yearly combat training plan, each pilot must fly 180 hours. Within the limits of this flying time, he is obliged to complete various exercises of the combat training course in order to confirm or receive the appropriate rating: "fully combat qualified" or "limited combat qualified". A crew (pilot) is considered ready to carry out combat operations, having completed the examination exercises and having no less than 15 hours of night flying, 6-8 landing approaches without the use of radiotechnical landing systems during the day and at night in good weather, 4-6 approaches during the day in bad weather, 1-2 flights on flight routes without the use of radiotechnical systems with positioning to a turning point along the flight path and 10-15 exits onto airfield regions using various navigation systems.

Along with completing flights, each pilot takes a year-long theoretical training course for a specialty and lessons on trainers. Up to 100 training

hours are spent on this. During the process of ground training, the probable enemy, the organization and missions of the ground troops, the tactics of aerial combat, the aircraft's design and engines, and the armaments systems are studied, and the activities in special flight situations and cooperation with the search and rescue service crews in the event of an emergency landing



maa : Fighter Squadron
M6aa : Fighter-bomber Squadron
tpa : Transport Squadron

pa : Reconnaissance Squadron
y6aa : Combat Training Squadron
spm : SAM BN

Figure 5. Location of the Main Units and Subunits of the Netherlands' Air Force and its Control Organs

or ejection are worked out. The capabilities of computers, complex trainers and training equipment are widely used in training. The modern complex trainers for F-16 aircraft, permitting any air situation to be created, are

set up at Volkel and Leeuwarden airbases. Another such trainer is being readied for operational status at Twente airbase.

The improvement in the air training, and the expansion and securing of the flight personnel's knowledge is accomplished within the air squadrons and wings.

For obtaining flight experience in various weather conditions and in an unfamiliar air and ground situation, the capabilities of other countries, members of the NATO bloc, are used. For this purpose, the exchange of flight crews is regularly carried out and various training contests are conducted. Since 1984, Dutch crews have been participating in "Red Flag" program exercises, conducted at the U.S. Air Force's Nellis airbase.

The results of daily training are verified during exercises. The largest of them are CENTRAL ENTERPRISE, AUTUMN FORCE, BLUE MOON and a number of others. The 314th Fighter-Bomber Squadron (NF-5A aircraft), invariably participates in the exercises of NATO's mobilization forces, ARCHWAY EXPRESS and TURKISH BALL, which recently most often are conducted in Norway and in the Baltic Straits zone.

According to foreign military reviewers' assessments, the level of crew training of the Netherlands' Air Force is the norm, adopted by NATO. During peacetime, the readiness of its forces and equipment is maintained at a level of 85-95 per cent (depending upon the types of aircraft and the weapon systems). As the journal ARMED FORCES reports, every day, three strike aircraft and two PVO fighters from each squadron, and one battery from each NIKE-HERCULES and IMPROVED HAWK SAM battalion are assigned to the alert force. Their readiness for take-off (launch) varies from 5 to 30 minutes.

At the same time, judging by reports of the weekly magazine, JANE'S DEFENCE WEEKLY, the high accident rate in air force units, especially flight incidences involving the death of flight personnel, is giving rise to great concern in the command. Because of these, there are insufficient qualified pilots in the country's armed forces. Accordingly, measures are being adopted to prevent flight mishaps, especially on the F-16 aircraft. A number of restrictions are being instituted, including that the minimum safe flight altitude is being increased and also attention to individual pilot training is being intensified.

AIR FORCE DEVELOPMENT is being carried out according to programs, worked out for ten-year periods. As the foreign press reports, as a result of the completion of the 1974-1983 program, the quality of the aircraft fleet was significantly increased. In this period, all five squadrons, equipped with F-104 aircraft, were reequipped with new F-16 fighters, for which 102 such aircraft were purchased. For the new program (1984-1993), it is planned to equip all combat squadrons with F-16 fighters, in accordance with which the decision was reached regarding the purchase of a supplementary lot of F-16s (111 aircraft), in order to replace the older NF-5s with them and to create a reserve for replacing possible losses. The retraining of flight personnel on new aircraft and the introduction into the combat composition of subunits is intended to be carried out at the following times: the 315th FBS--June 1986,

the 313th FBS- March 1988, the 314th FBS--during 1989-1991. At the same time that the squadrons transition to new aviation equipment, the modernization of F-16 aircraft, delivered in the first lot, is being carried out. In particular, their horizontal tail surface is being increased and new suspensions for medium range "air-to-air" missiles and a more powerful computer are being installed. Until 1986, all F-16 fighters in the inventory were equipped with the active and passive ECM units (the AN/ALQ-131 and ALE-40 respectively), and also a system for warning the crews about being painted by enemy radars (the AIR-46).

It is intended to carry out essential changes for air defense during this period. For example, by 1988, after the introduction of the new American PATRIOT SAMs into the inventory (4 batteries, 20 launchers, 160 missiles will be purchased), all NIKE-HERCULES SAMs will be removed from the inventory. By this same time, it is planned to redeploy the IMPROVED HAWK-equipped subunits, and to have six batteries in the FRG and also the same number on its own territory, and by 1993, four and eight batteries respectively. For combating low-flying targets, it is planned to purchase 640 mobile STINGER SAMs. The resources for the further modernization of the CRC and CRP equipment is being allocated.

Thus, the Netherlands' Air Force will have nine aviation squadrons of F-16 aircraft at the beginning of the 1990s, including six fighter-bomber squadrons (108 aircraft), two fighter squadrons (36 aircraft), one reconnaissance squadron (18 aircraft), four PATRIOT SAM batteries (20 launchers), two IMPROVED HAWK SAM battalions (12 batteries, 48 launchers), eight mixed air defense missile-artillery batteries (24 IMPROVED HAWK SAM launchers and 24 L70 antiaircraft guns), and 640 mobile STINGER SAMs. According to Western military experts' assessments, the combat capabilities of the Netherlands' Air Force will double, and because of this, it will be able to completely execute the missions entrusted to it by the NATO command.

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FOREIGN MILITARY REVIEW

NATO'S STRATEGIC ATLANTIC COMMAND

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 4, Apr 86 (Signed to press 7 Apr 86) pp 47-54

[Article by Capt 1st Rank V. Khomenskiy; "NATO's Strategic Atlantic Command"]

[Text] The Atlantic occupies a special place in NATO's aggressive plans and the politico-military leadership regards it as a principal combat theater. The region's significance is demonstrated by the fact that the main transportation routes cross it, over which, in time of war, many types of goods (primarily petroleum and petroleum products) of major importance to the economies and the armed forces of the capitalist countries of Europe and the U.S. would be transported. Additionally, in crisis periods and in wartime, strategic sealift of troops and cargo would be accomplished over the Atlantic sea lanes from the U.S. and Canada to reinforce the bloc's joint force components in Europe. The leading NATO countries' principal ports and bases, as well as shipyards and ship repair facilities are located along the Atlantic coast.

The broad expanse of the Atlantic theater, in foreign military specialists' views, permits wartime use of all existing means of combat forces including SSBNs, aircraft carriers and major air-capable combatants.

In view of the fundamental importance of the Atlantic theater, a Supreme Allied NATO Command in the Atlantic (SACLANT) was established in 1952. SACLANT's "zone of responsibility" (see Fig. 1) extends from the Arctic to the Tropic of Cancer and from the North American Continent to the coast of Europe and Africa, including therein all islands and territories of Portugal, as well as the Strait of La Manche and Pas de Calais and the coastal waters of the UK. The area of the zone is about 12 million mi².

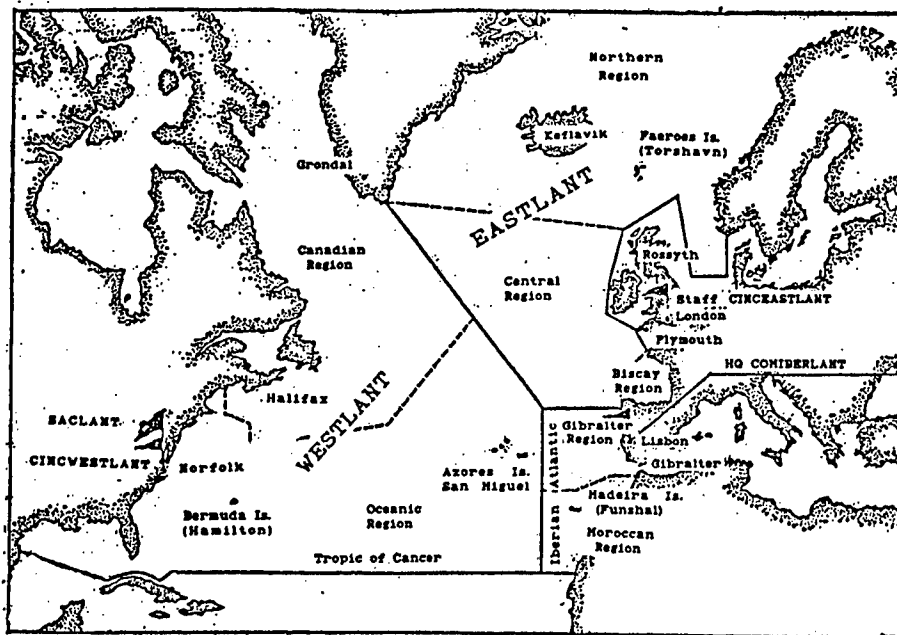


Figure 1. SACLANT "Zone of Responsibility"

SACLANT is headed by a U.S. Navy representative who also serves as Commander of all U.S. forces in the region. His peacetime functions are: development of operational plans for use of NATO national forces placed at his disposal; determination of requirements and informing respective national defense authorities of these; planning for operational and combat readiness and direction of joint and combined exercises; working out individual requirements concerning the condition and category of combat readiness of naval forces; designation of training and military standards; coordination of intelligence resources in the "zone of responsibility"; participating in development of the basic direction of NATO force buildup and control of the real state of combat readiness of national forces assigned or designated for assignment for his use.

In wartime, SACLANT: directs the conduct of operations of assigned units in accordance with plans developed in peacetime; organizes joint actions between the subordinate commands in the Atlantic, the major command of joint NATO forces in the La Manche Strait region and the joint forces commands in the European theater; and accomplishes necessary reassignment of forces in the zone and in separate regions of the Atlantic. Major SACLANT tasks are: achieving maritime superiority in order to ensure protection of sea lanes; guaranteeing sealift of reinforcement forces from the U.S. to Europe; preventing force increases of any likely enemy in the "zone of responsibility"; and demonstrating support for joint NATO forces in the European theater and NATO island commands.

As opposed to SACEUR (Supreme Allied Commander, Europe), SACLANT does not control troops or forces in peacetime, except for the standing NATO naval

force, Atlantic. However, for exercises and in wartime, NATO members make available to SACLANT advance ready contingents of forces, particularly naval. Along with this, they expect to transfer to SACLANT's operational control separate ground and air forces for the conduct of joint operations, mainly in the littoral areas of the European theater.

The SACLANT HQ is located on the main naval base of the U.S. Atlantic Fleet, Norfolk. It totals over 350 officers of all armed forces branches from eight countries (U.S., UK, Canada, FRG, Netherlands, Denmark, Norway and Portugal). An afloat headquarters staff is stationed in one of the U.S. Navy combatants.

In the "zone of responsibility", SACLANT command is divided into three zones, Western, Eastern and Iberian, which, in essence, are independent maritime theaters. In each of them a joint NATO allied command has been established. Furthermore, SACLANT commands the NATO Strike Force Atlantic, Joint Submarine Force, the Standing Naval Force Atlantic, and specials strike units for use in extraordinary circumstances (see Fig. 2).

In peacetime only the staffs of the indicated commands exist. Transfer to the complement of the respective commands of designated units and elements of national naval forces occurs incident to the conduct of NATO exercises and in crisis periods during simple or increased alert in accordance with the official NATO alert system. One exception is the standing naval force which includes, on an annual basis, combat ready warships to work combat readiness problems.

According to the foreign press, under SACLANT's operational command is a large portion of naval and air forces from navies of the U.S., Canada and the UK as well as elements of forces from the FRG, Netherlands, Norway, Portugal and other bloc countries. These forces can include up to 500 basic class ships, including 5-6 U.S. multipurpose and 2-3 British ASW carriers, more than 1,300 aircraft and helicopters and an amphibious division, a brigade and several detached battalions of Marines. Although France pulled out of the bloc's military organization, and her ships and planes are not a part of SACLANT, the NATO command, in developing its operational plans, considers France among joint Naval groups in appropriate areas, particularly in the Eastern Atlantic.

In wartime, the joint naval forces are given the following basic missions: delivery of nuclear strikes by SSBNs and carrier aviation; achieving maritime superiority and air superiority in the most critical areas of the Atlantic, in Norway and in the Barents Sea; anti-submarine and anti-surface warfare against enemy groups; designation of continuing air and surface ship gunfire support for joint NATO forces in the North European and Central European theaters; defense of sea lines of communications (SLOCs) in the interest of guaranteeing strategic sea lift of troops and military and economic cargo from the U.S. and Canada to Europe; carrying out seaborne amphibious operations and participation in anti-amphibious defense of the coast; and assigning support for the NATO Commands on the Atlantic islands.

Forces remaining under national subordination will function in close coordination with joint bloc forces in the Atlantic.

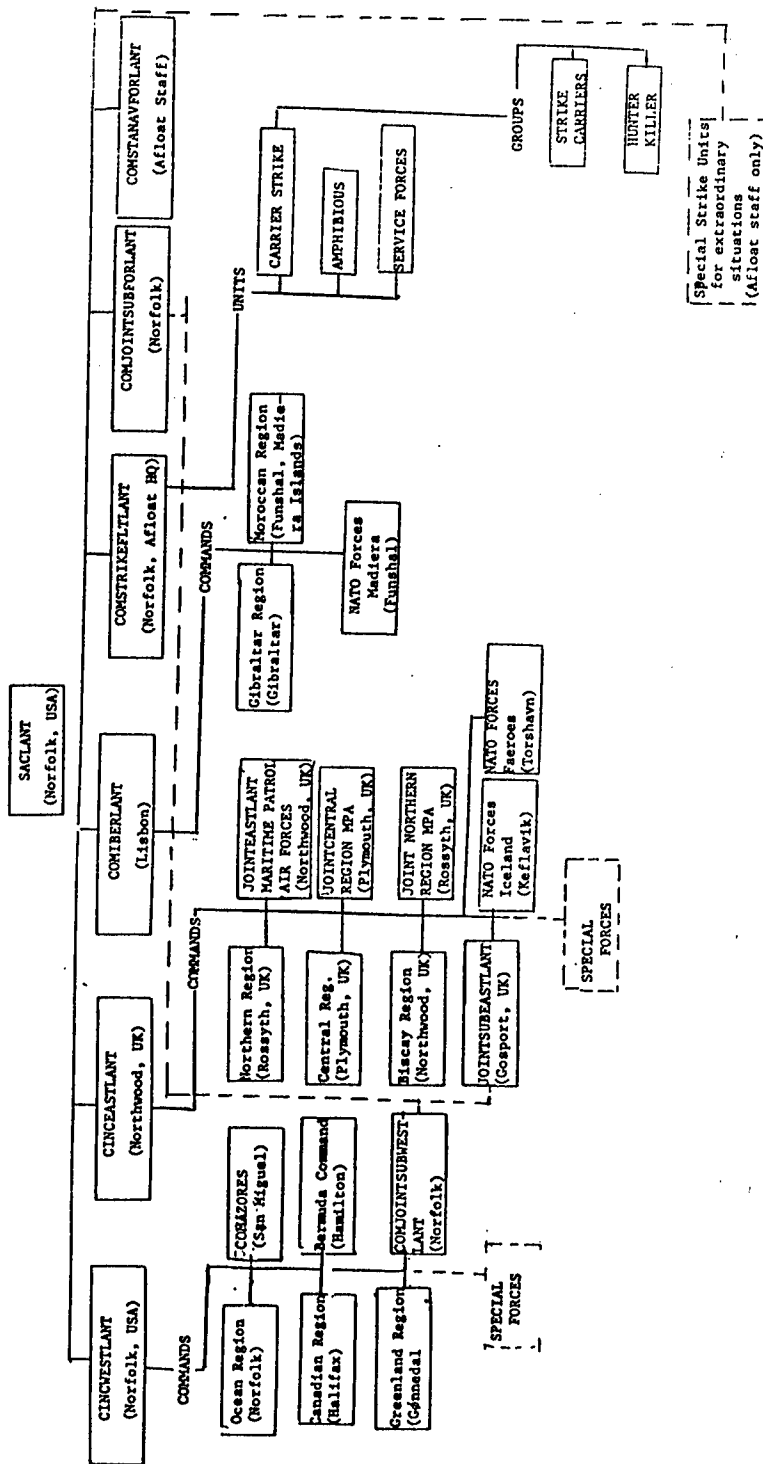


Figure 2. SACLANC Organizational Structure

The Supreme NATO Commander in the Atlantic is simultaneously the commander of the U.S. Atlantic Fleet (based in Norfolk). His "zone of responsibility" is divided into Oceanic and Canadian zones; in each of which a joint NATO navy command has been established. Command staffs are located in Norfolk (U.S.) and Halifax (Canada) and are headed by American and Canadian admirals. In war time, island commands are anticipated to be set up in Greenland, the Azores and Bermuda, wherein the staffs will be billeted respectively in Grondal, San Miguel and Hamilton.

Joint submarine forces in the Western Atlantic are subordinated to the NATO Commander, CINCPAC, as well as special designation forces, formed in the event of emergency.

Primary elements of CINCPAC are, according to the foreign press, U.S. and Canadian submarines, ASW warships and land based patrol aircraft, designated primarily for anti-submarine warfare on the Eastern coastline of the North American continent, as well as for supporting operational deployment of carrier strike forces in the Eastern Atlantic. Its numbers include about 100 combatants and over 300 landbased and seabased patrol aircraft and helicopters.

CINCEAN, by the strength of the region's critical geographic aspect, directly adjacent to the European continent and the northern borders of the Soviet Union, occupies a major role in NATO leadership's plans for combat against components of the fleet and air forces of a probable enemy. In this theater, it is expected they will concentrate all essential force to crush opposing maritime components of the enemy, disrupt his force deployment to other regions of the Atlantic, guarantee lift of reinforcing troops and military cargo along the final and most dangerous segment of the transatlantic convoy routes from the U.S. to Europe.

CINCEAN (with a HQ in Northwood, a suburb of London) is a British admiral, who simultaneously serves as the Commander in Chief of the La Manche Strait zone and is the Commander in Chief, Royal Navy.

The primary command zone is divided into three regions, in two of which, the North (HQ at RN Base Rosyth) and the Central (RN Base Plymouth), maritime commands have been established. The formation of the HQ of the joint NATO naval forces in the Biscay region is anticipated at the outset of hostilities. Under peace time conditions, resolution of problems concerning naval force employment in this region is placed upon the HQ staff of the NATO joint naval command in the eastern Central Region.

CINCEAN controls, in addition, joint submarine forces in the zone (HQ at Gosport, UK), and joint maritime patrol aircraft (Northwood, UK), which includes command of all aviation in the Central and Northern regions (HQ at Plymouth and Rosyth, UK respectively). In wartime, island commands in Iceland (Keflavik) and the Faeroes (Torskhaven) are created. Under emergency conditions special designation forces are formed.

According to the foreign press, primary CINCEAN assets include up to 150 surface ships and submarines and more than 250 aircraft and helicopters. It is

planned to deploy the NATO primary strike fleet in the Atlantic, capable of resolving the majority of operational questions facing them, in the CINCEASTLANT "zone of responsibility."

NATO Joint force main command in the Iberian Atlantic (COMIBERLANT) was created in 1967, soon after the departure of France from the bloc's military organization. Its "zone of responsibility" includes the territory of Portugal and the eastern aquatorium of the Atlantic, abutting the Pyrenees Peninsula and the northwest coast of Africa up to the Tropic of Cancer. A Portuguese admiral heads the command, aided by an American officer as Deputy.

Joint NATO naval commands in the Gibraltar and Morroco (Funshal) regions are subordinated to COMIBERLANT (Lisbon), and in wartime subordinates include the Madeira island command (HQ at Funshal).

As emphasized in the foreign press, COMIBERLANT has at his disposal up to 50 combatants and 30 maritime patrol aircraft from the Portuguese, U.S. and UK navies. If Spain joins the NATO defense organization, forces would be strengthened by 40 combat ships.

The strategic significance of the Iberian Atlantic, as foreign specialists indicate, is determined primarily by the fact that, in peace time, raw materials for the NATO Mediterranean countries are carried on its sea lines of communication, and in war time, the Strait of Gibraltar zone is an important link of sea communications, the successful defense of which will assure successful sealift of reinforcements troops and cargoes from the U.S. to the southern flank. Specifically because of this, as the foreign press notes, along with executing general maritime missions, the command has been assigned others, such as ensuring reliable control of the Strait of Gibraltar, supporting favorable operational actions in regions of highest shipping intensity, disrupting the deployment of probable enemy forces from the Mediterranean into the Atlantic and the augmentation of its Mediterranean forces from other fleets. These problems are worked out in annual Joint NATO naval exercises OPEN GATE and LOCKED GATE, in the major military exercise in the Atlantic, OCEAN SAFARI, as well as those conducted jointly with the U.S., Portuguese, French and British navies. In recent times the Spanish Navy has taken an active role in joint exercises in this zone. As NATO strategists plan, Spain, in time of war, would be assigned the mission of blockading the Strait of Gibraltar, and carrying out active combat efforts to destroy enemy naval forces in the western and eastern approaches.

Forces under the operational control of COMIBERLANT are designated for use in close coordination and mutual support with joint naval forces in the Ocean and Biscay regions of the Atlantic Theater.

NATO STRIKE FLEET ATLANTIC is looked upon by the bloc's high command as the most combat ready, combat capable and highly maneuverable operation formation in the region. It is established in the event the political-military situation is exacerbated or in the early stages of a war, as well as in periods during conduct of major NATO exercises and maneuvers involving the American SECOND FLEET, including in its formation separate combat ships and support units of the British, Dutch, German and other national navies.

COMSECONDFLT becomes the Strike Fleet Commander (shore-based HQ in Norfolk, sea going HQ aboard the amphibious command ship MOUNT WHITNEY.

According to the foreign press, these are the primary tasks of NATO Strike Fleet Atlantic (STRIKEFLTLANT): participation in nuclear strikes according to the plans of the NATO Supreme Commander in Europe (SACEUR) and to the regional plans of SACEUR's subordinate commanders in the North Europe and Central Europe theaters; achieving superiority in separate regions of the Atlantic, Norwegian and Barents Seas; defense of the ocean and sea lines of communications in the Atlantic, primarily in the interests of guaranteeing strategic sealift of reinforcing troops and military cargoes from the U.S. and Canada to Europe; ensuring the execution of maritime amphibious operations and participation in anti-amphibious defense of the Northwest coast of Europe; and designation of continuing air support to ground troops of the bloc in the North European and Central European theaters.

These problems are to be resolved by the units coming under the strike fleet command: strike aircraft carriers, amphibious assault units, service forces and the like which will be formed in emergency conditions for resolution of concrete operational and tactical problems.

The aircraft carrier battle group is the main combat formation in the strike fleet. It includes up to four U.S. multipurpose and 1-2 UK ASW aircraft carriers and more than 40 defensive warships. On the carriers are 360 to 380 combat aircraft including about 160 nuclear-capable (the A-6E bomber INTRUDER and the A-7E CORSAIR bomber, as well as the F-18 HORNET aircraft, newly entered into the fleet.

It is envisioned that 2-3 aircraft carrier battle groups and 1-2 hunter killer groups will make up a carrier battle force. A carrier battle group will include 1-2 U.S. carriers, 1-2 air defense cruisers, 6-12 destroyers and frigates (including 3-6 anti-air ships) and one nuclear submarine. According to the foreign press, in exercises in recent years issues concerning forming up an atomic strike fleet have been examined.

It is expected to assign the carrier strike groups duties of an offensive, strike nature, particularly the conduct of massive sea-based air strikes on enemy surface groups at sea and in bases; the support of ground forces in littoral areas and of amphibious forces during their landing and combat actions on the beaches; and SLOC defense, etc.

As noted in the foreign press, the primary operating areas of the carrier forces (in the experience of exercises NORTHERN WEDDING, OCEAN SAFARI and TEAM WORK) would be the Norwegian and North Sea, also the Bay of Biscay where carrier groups could operate independently or jointly.

Carrier hunter-killer groups could include 1-2 British INVINCIBLE-Class ASW carriers, each of which carry 5-8 SEA HARRIER FRS-1 nuclear-capable aircraft and up to 9 SEA KNIGHT ASW helicopters, an anti-air cruiser, up to 6 destroyers and frigates and one SSN. The ASW Carrier group can be employed for long range ASW defense of the strike carrier force during sea transits and in battle maneuver regions, for covering the transit of amphibious units toward

Europe shores as well as for independent search and destruction of enemy submarines in the outer ASW zone.

The amphibious assault element (landing ships and craft and landing forces) is formed and subordinated to the strike fleet commander only when actually executing assault landing operations. It could include up to 50 warships and transports, carrying up to 50,000 U.S. Marines from the 2nd Marine Amphibious Division as well as units and detachments from the 3rd Royal Marine Brigade and amphibious combat groups of the Dutch Navy. Transit of the amphibious assault elements to the landing zone in the North European theater (Northern Norway or the area of the Baltic Straits) and offloading of the landing force will be accomplished, as a rule, under cover of sea-based aviation and maneuver ASW forces of the strike fleet.

Material and technical support of strike fleet units is the responsibility of the service force ships, organizationally combined into a service force detachment. It could consist of about 15-20 navy supply ships and tankers from the U.S., UK, FRG, Netherlands and other NATO countries as well as chartered civilian shipping.

JOINT SUBMARINE FORCES IN THE ATLANTIC will be established at the outset of hostilities. During peace time, all issues concerning use of submarines in the interest of NATO are decided by the U.S. Commander of Atlantic Fleet Submarines (COMSUBLANT), who wears the hat as well of Commander, Joint NATO Submarine Forces Atlantic, as well as in WESTLANT. When hostilities commence, he assumes command of joint submarine forces in EASTLANT from the British admiral, and WESTLANT submarine forces are transferred to command of a different American admiral.

Joint NATO Atlantic submarine force headquarters staff (Naval Base Norfolk) devises plans in peacetime for submarine employment and in wartime coordinates them with joint naval commands in various Atlantic regions and with national commands; organizes surveillance operations; prepares proposals to SACLANT for application of submarine forces in planned operations.

The foreign press has noted that the joint submarine force will number more than 100 nuclear and diesel submarines from the U.S., UK, Canada, Norway, Denmark, FRG, Netherlands and Portugal. The possibility is not excluded of employment in their number the French multipurpose nuclear and diesel submarines.

The standing NATO naval force in the Atlantic (STANAVFORLANT) was first formed in January 1968. It is viewed as one component of the bloc's mobility forces, whose ships are in constant readiness.

The force is formed annually in January in one of the naval bases of Western Europe or America. Its permanent complement contains 5-7 modern frigate- or destroyer-class ships from the U.S., UK, Norwegian, Danish, German, Dutch, Belgian and Portuguese navies, which for 5-8 months replace corresponding ships in one or another of the bloc countries. During exercise periods it would be augmented by attached submarines, aircraft and service ships. At the end of

the year the force is decommissioned and its ships revert to national subordination.

A naval captain from one of the bloc countries is assigned as commander of the force, which is subordinated at all times to SACLANT, or, depending on the area of operations, to the commander of the respective region.

One of the fundamental problems of the force in peacetime is increasing the combat readiness level of the ships of various national affiliation within the STANAVFOR on the basis of multiyear experience. This is achieved by execution of independent combat preparedness, as well as by participation in joint exercises and maneuvers with NATO fleets. In addition they exercise the exchange of combat doctrine or crew members for purposes of familiarization with capabilities, armament, and service organization of ships of other nations.

According to the foreign press, at the outset of war there could be formed up, at the STANAVFOR peacetime base, a more potent operational force, which could be assigned independent tasks including achieving superiority in various regions of the ocean; strengthening NATO forces on the flanks of the European theater; ASW against enemy forces and protection of the transatlantic SLOC.

A SPECIAL JOINT STRIKE FORCE FOR OPERATIONS UNDER EXTRAORDINARY CIRCUMSTANCES is established by decision of the Military Planning Committee during worsening international conditions and the breakout of conflict in separate regions of the Atlantic. It will be formed on the basis of 1-2 U.S. aircraft carriers and defensive ships remaining in the Eastern Atlantic or Mediterranean Sea, the latter units preferably from the navies of NATO European countries. According to foreign defense experts, a Special Joint Strike Force will be responsible for defensive cover of the most important maritime communications zones and ensuring sea lift of reserves between European theaters, as well as providing in emergency situations continuous air support to ground forces in littoral areas until the arrival of the primary NATO strike fleet.

In Western military specialists' judgment, SACLANT occupies an important place in NATO's joint armed forces system. Designed in peacetime, the organizational structure of the command allows operational control of those national forces assigned to him in crisis period (or at the outset of war) and organization and conduct of various types of operations in armed conflict using conventional or nuclear weapons. Within the bloc's framework and in the plans of various countries, a wide range of measures are conducted to improve operational capability of the Atlantic theater, to better the conditions of basing, repair and ship construction, and to broaden opportunities to receive reinforcement troops and equipment, transported from the U.S. and Canada to Europe. Considerable attention is paid to equipping the theater with fixed systems of submarine detection, and to organizing surveillance of surface, submarine and air pictures within the boundaries of all the theaters.

In recent years there has been an increasingly active movement of NATO's political-military leadership to include in the "zone of responsibility" regions south of the Tropic of Cancer, and practical steps have been taken toward the construction of new, and enlarging existing bases and fleet basing

points in the southern basin of the world ocean. This broad expansion in this region is attempted to be justified by an imaginary "threat" on the part of the USSR to NATO countries' sea lanes in the Southern Atlantic and Indian Ocean, and by the necessity to establish a counterweight of some sort to the increase in recent years of the maritime presence of our fleet in these regions. The myth of "Soviet military threat" serves to cover the widening of military presence of the U.S. in other regions of the world, arbitrarily announced as zones of "vital interest", (and to cover) creation of tension focal points and of stepping stones for attacking peaceloving nations and people.

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FOREIGN MILITARY REVIEW

BRITISH NUCLEAR SUBMARINES

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 4, Apr 86 (Signed to press 7 Apr 86) pp 54-58

[Article by Sr Lt I. Dalin; "British Nuclear Submarines"]

[Text] The British political-military leadership, following the adventuristic policies of the U.S. and NATO, are devoting increasing attention to the construction of nuclear submarines. As a result, Great Britain has one of the most powerful nuclear submarine fleets in the capitalist world (18 units) and is continuing to actively build new SSNs. Their fleet is composed of the following classes of SSNs: VALIANT (lead ship plus five others), SWIFTSURE (six units), TRAFALGAR (three in service and two under construction), and also one class of SSBN, RESOLUTION (four units). Their tactical-technical characteristics, taken from the latest data in the foreign press, are shown in the table.

The VALIANT-Class SSN (lead ship) entered operational fleet service in 1966, and during the period 1967-1971, four more followed: WARSPRITE, CHURCHILL, CONQUERER, and COURAGEOUS.

As indicated in the foreign press, it was decided during VALIANT's construction to adopt the design of DREADNOUGHT's bow section (Figure 2, the Royal Navy's first nuclear submarine, in service from 1963 to 1982) and a nuclear propulsion plant of British manufacture (reactor core Type A). Several changes and improvements to eliminate shortcomings discovered in DREADNOUGHT were also incorporated.

For example, the bow planes were moved aft of the bow sonar array since they were found to interfere with sonar operations, and auxiliary electric propulsion motors, that operate independently of the reactor plant, were installed in the stern. Radiated noise levels were reduced by various means, depending upon the ship's speed. An electric propulsion motor is provided for operating at sonar search (low) speeds. A vibration dampening system is employed for the turbines and main reduction gears, but Western experts consider it effective only up to moderate speeds, as used in joint operations with surface ships and convoy escort duties. At full power for flank speed, such as used for interception, enemy evasion, and transit to a patrol area, the anti-vibration system is locked out.

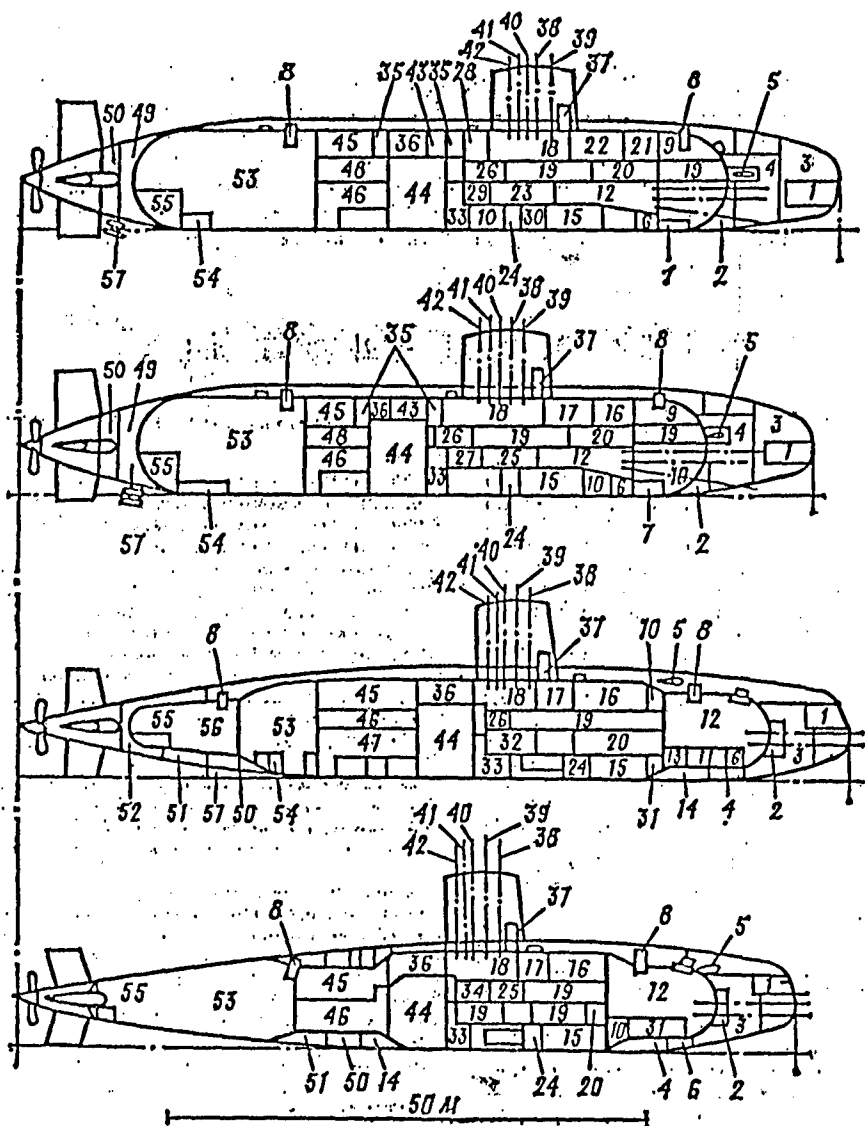


Figure 2. General-Arrangement Diagram of Royal Navy Nuclear Submarines
DREADNAUGHT, VALIANT, SWIFTSURE, and TRAPALGAR (bottom to top)

1. Bow sonar array; 2. Torpedo compensation tank; 3. Main ballast tank (MBT) #1; 4. MBT #2; 5. Bow planes; 6. VRT tank; 7. Torpedo tube drain tank; 8. Escape trunk; 9. Escape room; 10. Store room; 11. Torpedo impulse tank; 12. Torpedo room; 13. Forward trim tank; 14. MBT #3; 15. Battery well; 16. Officer staterooms; 17. Sonar room; 18. Control room; 19. Berthing space; 20. Sonar equipment room; 21. Ship's computer equipment room; 22. Sonar and radar room; 23. Berthing space and ship's inertial navigation equipment room; 24. Auxiliary machinery space; 25. Radar and EW room; 26. Air conditioning room; 27. High pressure air manifold and ship's inertial navigation equipment room; 28. Radio room; 29. High pressure air manifold room; 30. Submarine electrical power control panel; 31. Air cleaning and regeneration equipment room; 32. Radio room and high pressure air manifold; 33. Diesel fuel tank; 34. Air conditioning room and high pressure air manifold; 35. Passageway air lock; 36. Tunnel; 37. Bridge trunk; 38. Retractable radar mast; 39. Periscopes; 40. Retractable EW mast; 41. Snorkel induction; 42. Snorkel exhaust; 43. Reactor plant control system and shielding room; 44. Reactor compartment; 45. Reactor plant control room; 46. Diesel generator room; 47. Turbine generator room; 48. Electrical distribution room; 49. MBT #3; 50. MBT #4; 51. MBT #5; 52. MBT #6; 53. Engine room; 54. Oil tank; 55. After trim tank; 56. Motor room; 57. Auxiliary propulsion motor.

Due to the measures undertaken to reduce noise, improve the propulsion plant, and make the fabrication of critical machinery easier, the displacement of the VALIANT Class submarines grew to 4,800 tons.

The planning process also revealed several shortcomings of these submarines: poor dynamic stability, an intolerable tendency to assume a down angle while submerged, and the pressure hull had an insufficient internal volume to permit future modernization of their electronic gear.

In order to eliminate these problems, the designers were forced to lengthen the pressure hull and incorporate trim tanks and a water-round-torpedo (WRT) tank.

Since inspections of DREADNOUGHT revealed hull cracks at the joints of her frames and hull plating, and stratification of the metal at the butt joints of that plating, designers refrained from using QT-35 steel and instead used American HY-80.

Compared with the American PERMIT Class, the VALIANTs have a greater displacement, lower top speed, and shallower diving capability.

SWIFTSURE, lead ship of a new class, entered the fleet in 1973, and the last unit (the sixth), SPLENDID, entered service in 1981.

During the construction of the SWIFTSURES, attention was focused on improving their depth capability, increasing their submerged speed, reducing radiated and sonar self-noise, extending endurance, raising the operational stress coefficient, and improving the reliability and maintainability of the nuclear propulsion plant.

The increase in maximum depth, over VALIANT, was achieved by inserting a cylindrical section which constitutes a major portion of the length of the pressure hull and by using a new British steel (NQ-1) which is stronger than QT-35.

In order to reach high submerged speed, a new reactor core (Type B) was developed which has a higher power density and longer core life than the TYPE A core.

An analysis of the weight distribution and internal volume of the pressure hull led to a more efficient internal equipment layout, particularly in the engine room. In addition, the volume of the external main ballast tanks was cut to 11 per cent of the total submerged displacement, while internal main ballast tankage amounted to 2 per cent of the ship's reserve buoyancy.

The bow planes were moved into alignment with the ship's longitudinal axis aft of the bow sonar array (see Figure 2). This ensured maximum control surface effectiveness while minimizing their size and consequently reducing hydrodynamic drag on the hull. The size of the sail (or fin) was reduced for the same reason. In conjunction with the aforementioned technical refinements, SWIFTSURE was also fitted with an entirely new stern section tapered at 45° (VALIANT's is 30°), which, in foreign experts' opinion, should have provided

a better performance coefficient. In reality, however, this has not proven to be true. Such a stern section does provide a large volume to accommodate the after main ballast tanks and extra space for the arrangement of main propulsion equipment and machinery in the engine room.

TACTICAL AND TECHNICAL DATA ON BRITISH NUCLEAR SUBMARINES

SUBMARINE CLASS NUMBER IN SERVICE (HULL NUMBER) DATES OF ENTRY INTO FLEET	DISPLACEMENT (TONS) SURFACED SUBMERGED	BASIC DIMENSIONS (M) LENGTH/BEAM DRAFT	SHAFT HORSEPOWER MAXIMUM SPEED SURFACE (SUBMERGED)	TEST DEPTH (M)	COMPLEMENT TOTAL (OFFICERS)	ARMAMENT
SSN						
VALIANT - 5 (S 102, 103, 46, 48, 50) 1966-1971	4300 4800	86.9 10.1 8.2	15,000 18 (28)	300	103 (13)	5 x 533 MM TORPEDO TUBES (31 TORPEDOES)
SWIFTSURE - 6 (S 126, 108, 109, 104-106) 1973-1981	4400 4900	82.9 9.8 8.2	18 (30)	.	97 (12)	5 x 533 MM TORPEDO TUBES (25 TORPEDOES)
TRAFALGAR - 3 (S 107, 110, 117)	4650 5200	85.4 9.8	. (32)	.	97 (12)	5 x 533 MM TORPEDO TUBES (25 TORPEDOES)
SSBN						
RESOLUTION - 4 (S 22, 23, 26, 27) 1967-1969	7600 8500	129.5 10.1 9.1	15,000 20 (25)	300	143 13	16 POLARIS A-3, 6 x 533 MM TORPEDO TUBES (20 TORPEDOES)

A significant amount of attention has been devoted to the problem of noise and sonar self-noise reduction. Accordingly, the bow sonar array, which on VALIANT was located above the ship's longitudinal axis, was placed below it on SWIFTSURE to reduce the effect of surface reflected signals. SWIFTSURE also has a special acoustic coating on her pressure hull and superstructure as well as a fiberglass fairing over her bow sonar array. A single platform was specially developed for this SSN's propulsion plant which holds the turbines, turbine generators, condensers, main reduction gears, and bed plates for auxiliary equipment. The latter provide sufficient vibration dampening right up to maximum plant operating power. Flexible hull sockets were installed to improve sound isolation of the condensers and sea water circulation system. The noise producing characteristics of all auxiliary equipment was thoroughly analyzed, and those which did not meet the new stringent specifications were replaced. It has been reported that the propulsion shaft rotation rate was reduced to minimize noise.

Special attention was given to designing the ship for long endurance and reliability of shipboard systems and equipment for which the following measures were taken: reduce the quantity and length of the sea water piping system and significantly upgrade the shock resistance of the main ballast tanks. Three types of compartment flooding detection and alarm systems were installed. In the first system, sensors are located in potentially dangerous (from the crew's standpoint) piping and are activated by a drop in pressure

associated with the loss of system integrity. The second system contains simple float sensors located in the lower part of the compartment. Lastly, a manual compartment flooding alarm system was included.

The weapons and electronic systems remained the same as those aboard VALIANT. However, the relocation of the bow sonar array to below the ship's longitudinal axis required that one of the six torpedo tubes be eliminated. Of the five remaining torpedo tubes, four are arranged in pairs one above the other from port to starboard athwarships, and the fifth is situated at an angle to the primary plane. Regardless of the difficulties in loading weapons, this torpedo tube arrangement is much more suitable for the purpose of optimizing the operation of the bow sonar system.

In order to improve the sonar search capability off either beam, a supplementary hydrophone array was installed which was integrated into the sonar suite. A new Combat Information Direction System was developed based on advanced computer technology.

In the final analysis, SWIFTSURE's displacement came out to be 100 tons more than VALIANT. This is an insignificant increase, however, compared with the multitude of alterations and technological improvements incorporated in her design.

TRAFALGAR was the lead ship of the next class of SSNs, and entered the fleet in 1983. The second, TURBULENT, entered in 1984, and the third, TIRELESS, in 1985. Altogether, seven of these SSNs are planned. Their design involved primarily new technology and lessons learned from their predecessors. Modifications of any sort were only made where they were absolutely essential.

During the planning process, the designers reached the conclusion that a further increase in depth capability was unjustified, considering the marginal gain in combat effectiveness, and no change was made. They are identical to the SWIFTSURES in that respect. With regard to the propulsion plant, they are also unchanged except for a new longer-lived Type Z reactor core.

As before, a great deal of importance was attached to noise reduction. For this purpose, a design was finally chosen which has separate platforms for the main propulsion machinery and auxiliary equipment. The acoustic signature was further reduced through the use of a new means of platform vibration dampening and a better anechoic coating.

New weapon and electronic systems were developed and installed including a sonar system with a towed array and a modified bow sonar with an entirely different processor for computer-aided processing of incoming signals and output data, an improved Combat Information Direction System, and a launch system for HARPOON anti-ship missiles.

All these modifications required that the SSN be lengthened by several frames and, as a result, her submerged displacement grew by 300 tons over that of the SWIFTSURE-Class SSNs.

The RESOLUTION-Class nuclear ballistic missile submarines entered service in the Royal Navy during the period 1967 to 1969.

Foreign experts consider the features of the RESOLUTION-Class SSBN design to be a combination of those developed for American SSBNs and preceeding British SSNs. The missile compartment was based on the American prototype, and the propulsion plant and torpedo armament were borrowed from the VALIANT design.

The nature of an SSBN design, however, called for a number of alterations and additions to be made. Therefore, special attention was devoted to developing systems to maintain the ship's depth by hovering and compensate for the weight of the missiles as they are launched, improved communication and navigation systems, and propelling the ship at low speeds. The growth in crew size meant that changes had to be made in the ship's life support systems.

The requirement to have adequate reserve bouyancy created a particular problem; there was a shortage of space in the bow and the stern. One of the main ballast tanks (1.5 per cent of the surfaced displacement) was, therefore, relocated inside the pressure hull. As it turned out, the submerged displacement of the RESOLUTION-Class SSBNs reached 8,500 tons.

As foreign experts point out, construction of succeeding generations of British submarines will be characterized by building small numbers within each class (five to seven units apiece) while capitalizing on American experience in their research and development of pressure hull designs, propulsion equipment, weaponry and other technologies.

At present, the British political-military leadership, in carrying out their aggressive plans, are continuing to pursue military objectives which include the development of new SSN designs. Their construction, however, will probably be delayed by the decision to build a new class of SSBN armed with the American TRIDENT-2 SLBM.

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FOREIGN MILITARY REVIEW

SWEDISH SHORE-BASED HELLFIRE ANTI-SHIP MISSILE INSTALLATION

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 4, Apr 86 (Signed to press 7 Apr 86) pp 59-60

[Article by Capt 1st Rank V. Mochalov; "Swedish Shore-Based HELLFIRE Anti-Ship Missile Installation"]

[Text] Sweden's Ministry of Defense plans to put the HELLFIRE mobile coastal antiship missile system (PKRK) into service in 1987. It is designed to combat landing craft and cutters which conduct landing assaults in skerries, narrow waters and strait zones. It is being developed under a 7.7 million dollar contract concluded with Rockwell International.

The coastal PKRK will include a reusable tube-guided launcher [PU] on a tripod, a PKR [antiship missile] (with a firing range up to 6,000 m) and a laser unit for target illumination. The ammunition reserve for each PU is six missiles. A new program for the missile's guidance system, which allows it to complete the flight at low altitudes over the surface of the water, and also a penetrating warhead, equipped with a time-delay contact fuse is being developed for the purpose of using the HELLFIRE PTUR [ATGM] for coastal defense. The latter insures the explosion of the 12-kg warhead after the missile's penetration into the ship's internal compartments, which significantly increases its destructive power. The antiship variant of the HELLFIRE missile (weight, 43-kg, length, 1,626 mm, diameter, 177.8 mm, wing span, 330 mm), as with the PTUR, will have a semiactive laser-guided seeker. After detection, the target will be illuminated by the laser unit, the type of which has not yet been selected. Two lasers units made by Hughes, existing in the ground forces' and marine's inventory, and one by the Ferranti firm are being considered.

The missile's warhead and launcher is being developed by the Swedish firm Saab Bofors. According to a statement from representatives of Rockwell International, the weight of the antiship variant of the missile can be reduced to 9 kg. At the end of 1986, a decision must be reached regarding the beginning of series production of the HELLFIRE PKRK. Sweden's government plans

to purchase approximately 1000 HELLFIRE PKRs in 1987-1988. It is expected, that the final assembly of the missile will be accomplished by a Swedish firm.

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FOREIGN MILITARY REVIEW

SOUTH KOREA (MILITARY-GEOGRAPHICAL DESCRIPTION)

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 4, Apr 86 (Signed to press 7 Apr 86) pp 66-72

[Article by Col K. Kozlov, Candidate for Military Sciences; "South Korea, A Military-Geographical Description"]

[Excerpts] South Korea occupies the Southern part of the Korean Peninsula, which, since olden times, has been the target of imperialistic expansion. South Korea's direct proximity to the KNDR (Korean Peoples' Democratic Republic) and the USSR determines its strategic significance in U.S. aggressive plans. It is an important springboard for American armed forces on the continental part of the Far East region.

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MILITARY INDUSTRY. U.S. military-strategic interests in the Far East exerted great influence in the creation of South Korean military industry. The 1950-1953 war proved that the old Japanese plants in South Korea could not serve as a repair and rehabilitation base for U.S. military equipment. Therefore, from 1954 through 1964, Washington provided five billion dollars in military and economic aid to create a reliable South Korean military-economic base. During the U.S. aggression in Vietnam, the Pentagon enlisted nearly three-fourths of the capacity of South Korean heavy industry to fill military orders.

In the 1970s, South Korea began to create military enterprises, reconstruct former Japanese military plants, adjust its own production (on license) of small arms, artillery and armored armaments at a forced rate. As a result, by 1980, all the elements for military industry had been formed which, in foreign specialists' estimate, allow, at the present time, the Seoul regime to support, to a significant extent, numerous armed forces with artillery-small arms and armored weaponry by its own production.

Enterprises belonging to the administration play a leading role in military industry. However, nearly all the large private companies, directly or indirectly, participate in military production (1). M16, M60 and M81 rifles, 106-mm mortar, 20-mm 6-barreled VULCAN cannons for self-propelled air defense batteries, 105- and 155-mm howitzers, armored personnel carriers, medium tanks, military aircraft and helicopters, warships and cutters, ammunition,

various communications equipment, military trucks and "jeeps," and also surface-to-surface guided missiles with 150-km range and unguided surface-to-surface missiles with 35-km range, anti-tank guided missiles in plants in the cities of Pusan, Masan, Changwon, Kwangju, Taegu, Ulsan and others, and has mastered the production of a salvo fire missile battery.

In foreign military experts' estimate, the weakest link in South Korean military production is the inadequate manufacture of engines for tanks, helicopters, aircraft, missiles and warships. To eliminate this deficiency, agreements with a number of American and West European firms have been concluded recently concerning the construction of new military plants with full technological production cycle for the production of military equipment and weapons.

. . . .

ARMED FORCES. According to foreign press information, the regular South Korean armed forces number 598,000 men and consist of the ground forces (520,000), air forces (33,000), and navy (45,000).

The Ministry of Defense gives daily leadership and guidance to the armed forces, directs the construction of the armed forces, their recruitment and combat training, and is responsible for the organization of control and troop material and technical supply. It includes a number of departments: planning, personnel, reserve training, defense industry and others.

There is a joint chiefs of staff committee for working out the most important decisions and operational leadership of forces. It is made up of the commanders of the armed forces branches. The chairman of the committee is appointed by the president for two years. The joint chiefs of staff committee coordinates its activities with the U.S. armed forces command. Each branch of the armed forces is headed by a commander-in-chief who is at the same time, the chief of staff and through whom it carries out direct operational leadership of forces (2).

American strategists assign to Seoul the role of participant in the Pentagon's military adventures in the Far East. As early as 1978, the so-called "Joint American-South Korean Command" was formed. Under its cover the American command essentially took unto itself completely the leadership of the South Korean forces. While preparing the puppet regime for aggressive actions, Washington annually spends an ever-growing amount on its militarization. Thus, in 1985, 240 million dollars in the form of military aid was given to Seoul, and from 1985-1989, the Pentagon intends to supply South Korea with 8 billion dollars worth of combat equipment and weapons.

For its part, the Seoul regime will not skimp on military expenditures. Thus, in 1986, the military budget was approved on the scale of 4 trillion, 300 billion won (more than 5 billion dollars). This exceeds by 13 per cent the appropriations for military purposes for last year. Military expenditures have reached 40 per cent of South Korea's budget. According to foreign specialists' reports, a large share of these resources will be directed at acquisitions for maritime, primarily offensive, types of weapons and combat equipment. For

example, it is planned to buy F-16 fighter-bombers, guided-missile destroyers, missiles, and helicopters. As Western specialists note, by constant and comprehensive aid and support, the U.S. has already created in South Korea powerful armed forces, equipped with modern weapons and military equipment.

South Korean territory is being turned into a heavily fortified with a developed infrastructure. The air forces are arranged by a significant number of bases and airfields fitted out for use by modern combat aircraft. The largest airbases were built in the areas of the cities of Kanyyn, Seoul, Chungchon, Khwenson, Wonju, Inchon, Suwon, Chungju, Andong, Iri, Naju, Ulsan, Kimhae, Taegu, Chegu, Osan, Kunsan, Kwangju. The main South Korean naval bases are Chinhae, Inchon, and Pusan. Fleet forces can also use basing points and ports of Pohan, Mokpo, Mukho and Chegu.

The construction of the "wall" occupies the main place among the measures being built by the South Korean command to improve the territory's operational equipment. On South Korea's northern border, at the 38th parallel, along the military demarcation line, for a length of 240 km, a steel-reinforced concrete "wall" has been erected by the South Korean government, jointly with the American command. According to foreign press data, it is an earthen embankment 6-10 m high and 15-20 m thick at the base. The front of the wall is faced with steel-reinforced concrete 5 m high. The "wall" has numerous firing points and permanent firing installations. Using it, the U.S. would like "to fence in its vitally important interests on the south of the peninsula."

The Americans have built 40 military bases in South Korea. According to foreign press reports, more than 40,000 U.S. soldiers and officers, approximately 110 combat aircraft, 90 nuclear artillery weapons, and nearly 1,000 nuclear munitions have been stationed in South Korea. U.S. armed forces use 30 airbases here. Under the pretext of "modernization," the Pentagon's armed forces are attempting to store also PERSHING-2 missiles, cruise missiles, and neutron weapons. The greater part of the U.S. armed forces' projects are located in the northwest part [of the country].

Reinforcement of the U.S. nuclear arsenal in South Korea with new resources cannot be regarded otherwise than direct preparation for the unleashing of armed conflict in that region using nuclear weapons. The plans for conducting such a war in the region are worked out in the joint U.S. and South Korean armed forces maneuvers TEAM SPIRIT.

Washington and Seoul answer the KNDR's peaceful proposals with provocative maneuvers and strive to create obstacles in the way of the peaceful Korean unification. It is in precisely this context that one should consider the build up of American military presence on the Korean peninsula and the transformation of South Korea into a bridgehead and hostage of the U.S. adventurist policies

The Soviet Union has been and is in favor of strengthening security in Asia. "We are for," Comrade M. S. Gorbachev emphasized in a report to the 4th session of the USSR Supreme Soviet, 11th convocation, "good neighborliness, mutual trust and cooperation in order to widen the political dialog between all states located here, in the interests of peace."

1. For details on this, see ZARUBEZHNOYE VOYENNOYE OBOZRENIYE, No. 11, 1984, pp. 28-32--Ed.

2. For details see: ZARUBEZHNOYE VOYENNOYE OBOZRENIYE, No. 5, 1985, pp. 29-31; No. 4, 1985, pp. 54-58; No. 3, 1985, pp. 53-57--Ed.

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FOREIGN MILITARY REVIEW

RSA AIR BASE NETWORK

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 4, Apr 86 (Signed to press 7 Apr 86) pp 72-74

[Article by Col A. Padin; "RSA Airbase Network"]

[Text] The Republic of South Africa (RSA) is imperialism's main stronghold on the African continent. It serves as a guide for Western countries for economic expansion in the liberated countries of South Africa, as a restrictive factor in the movement of the young independent states of the region along the path of development. Its armed forces play no small role in the conduct of reactionary internal and aggressive foreign policies. The air force is the main strike component, in whose support an airbase network is constantly being developed and improved (see figure): new ones are being built, old ones are being reconstructed, and parts of the superhighway are being equipped to accommodate take-off and landing strips.

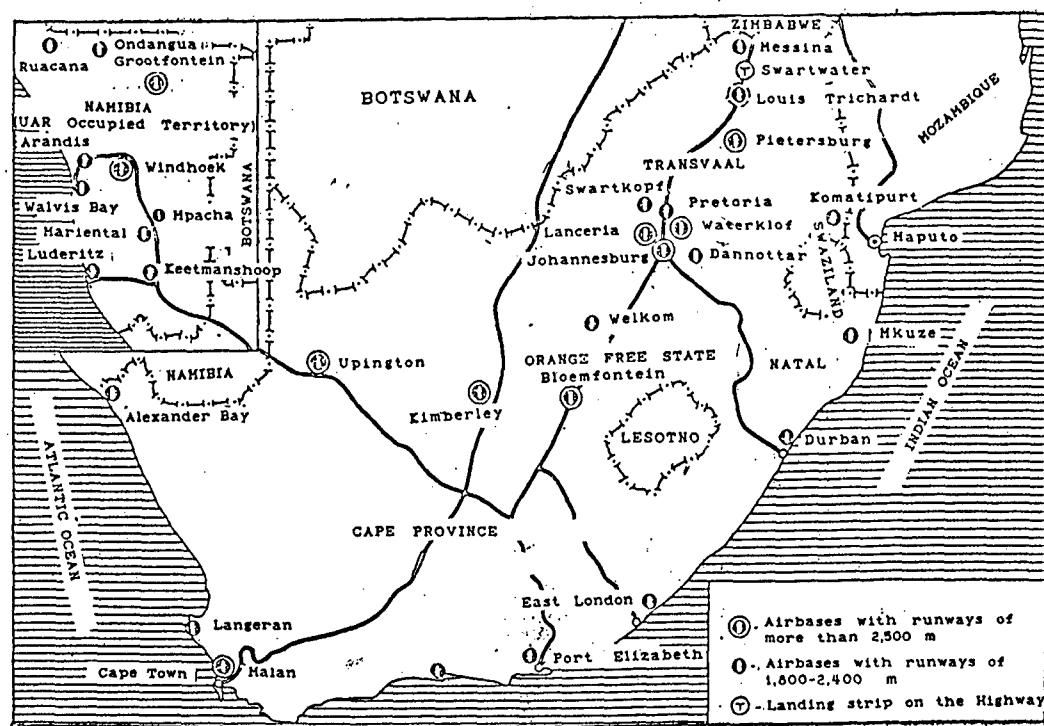
Recently, airbases on territory in Namibia (Windhoek, Grootfontein), which is illegally occupied by the RSA, were reconstructed. These and other airbases located here are actively used to support the operations of special RSA ground forces punishment subunits for finding and destroying bases and partisan detachments of the Peoples' Organization of Southwest Africa (SWAPO), and also to support the UNITA bands in Angola. Thus, for example, the RSA Air Force's principal combat aircraft, the IMPALA-2, can reach targets on Angolan territory, 250-300 km from the border.

According to foreign press material, there are, at the present time, more than 200 airbases in the RSA, of which approximately 100 have hard surface landing strips, the remaining have dirt strips. Of the latter, 24 airbases are used by the Air Force command and the remaining, by civil aviation and large mining firms.

The characteristics of the 31 largest airbases (landing strips more the 1,800 m) and their navigation equipment are given in the table.

Of the airbases enumerated in the table, the RSA Air Force uses constantly those at Bleomfontein, Waterkloof, Grootfontein, Windhoek, Dannottar, Durban, Johannesburg, Cape Town (Westerplaas and Malan), Langreban, Ondangua, Pietersburg, and Swartkopf and helicopters and communications aircraft use the

dirt field at Port Chefstrom. One should take into account that the IMPALA-2 aircraft can, when necessary, use dirt fields.



Schematic of the RSA Main Airbase Disposition

Airbase radio navigation equipment, as a rule, comprises a homing radio station, a radio direction finder and a flight-control radar. The airbases at Waterklopf, George, East London, Johannesburg Cape Town (Malan) and Port Elizabeth are equipped with aircraft instrument landing systems.

Practically all the Air Force airbases have fixed ammunition depots, fuel and material-technical resources and repair shops.

Many of the airbases located in the strategically important regions of the country are used to supply the highly mobile ground and special forces. In particular, they provide rapid air lift of special subunits trained for the suppression of national liberation forces. The RSA airbase network is also used for rendering aid to the police and special services.

The country's largest international airports, which can be used by combat and heavy transport aviation, are Johannesburg and Durban. their traffic capability is significant. In particular, more than 3 million passengers and more than 100,000 tons of freight pass through the Johannesburg airport annually. From it international flights depart for 16 of the largest cities in

Europe and America, for example, London, Paris, Frankfurt (FRG), Rio de Janeiro and others. The RSA civil airports provide airlift of passengers and freight both inside the country and to many African states.

THE LARGEST RSA AIR BASES

(With Hard Surface Runways)

Airbase	Length of Runway, m	Equipment
Alexander Bay	1,800	Radar, Radio direction finder, Illumination (STO).
Upington	2,440	Ditto
Arandis (Namibia)	1,920	Ditto
Bloemfontein	2,560	Ditto
Waterkloof	3,350	Ditto and an instrument landing system
Welkom	2,000	Radar, homing radio station, STO
Windhoek (Namibia)	4,530	Ditto
Grootfontein (Namibia)	2,680	Ditto
Dannottar	1,880	Ditto
George	2,000	Ditto and an instrument landing system
Durban	1,940	Ditto
East London	1,935	Ditto
Johannesburg	4,400	Ditto
Cape Town (Malan)	3,200	Ditto
Keetmanshoop (Namibia)	2,315	Radar, homing radio station, STO
Kimberley	2,440	Ditto
Komatipurt	2,130	Ditto
Langeban	2,340	Ditto
Lanceria	3,050	Ditto
Luderitz (Namibia)	1,830	Ditto
Mariental (Namibia)	2,000	Ditto
Messina	1,920	Ditto
Mkuze	1,870	Ditto
Mpacha (Namibia)	1,980	Ditto
Ondangua (Namibia)	2,300	Ditto
Pietersburg	2,560	Ditto
Port Elizabeth	1,980	Ditto and instrument landing system
Pretoria	1,830	Radar, homing radio station, STO
Ruacana (Namibia)	2,130	Ditto
Walvis Bay (Namibia)	2,130	Ditto
Swartkopf	1,830	Ditto

The RSA leadership strives constantly to improve basing conditions for its air forces, while using them for carrying out its aggressive course and while pursuing the goal of achieving absolute superiority over the neighboring countries. This completely coincides with the schemes of U.S. imperialist circles and their partners in the military blocs, who are counting on the RSA as their ally in the struggle against free African countries.

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FOREIGN MILITARY REVIEW

SOME MEDICAL SUPPORT PROBLEMS DURING THE FALKLANDS CONFLICT

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 4, Apr 86 (Signed to press 7 Apr 86) pp 75-76

[Article by Capt V. Denisov; "Some Medical Support Problems During the Falklands Conflict"]

[Text] Foreign military specialists continue to analyze the causes and results of the conflict between Great Britain and Argentina in 1982 in the South Atlantic, and they generalize the experience of employing all branches of the armed forces. A great deal of attention is paid to the analysis of the organization for medical support during combat operations.

By the decision of the English command, 13 military doctors, including specialists in general, jaw and face, and reconstruction surgery and, additionally, a group of nurses and supplementary personnel (62 persons) were sent to the Falklands (Malvinas) area in the ocean liner UGANDA which had been reequipped as a hospital ship in 65 hours. More than 1,000 beds were installed in the ship and the recovery room had nearly 100 places. Besides UGANDA, three naval oceanographic ships, GERALD, HYDRO, KHEKIA, were reequipped as medical transports. They were the main means for evacuating the wounded and stricken during combat operations.

According to the English military press, from 16 May through 13 July, 1982, qualified medical aid was rendered to 730 servicemen, 92 per cent of whom were stricken during combat operations. Of them, 500 were evacuated by the medical transport ships to Montevideo (Uruguay) and then by air to Great Britain.

According to an announcement by the head of the British military medical service, the medical treatment of the burn victims was particularly difficult. A specific problem arose also when organizing the supply of donor blood, mainly because of the limitations of its reserves. The problem was solved by enlisting a large number of servicemen in the homeland as donors. In the process of creating the necessary blood bank it was ascertained during classification that the blood type of 2.7 per cent of the donors (stamped on each serviceman's ID tag) did not correspond to the data on the tag. In all, 3,262 medical doses of bottled blood were prepared of which only 605 were used during the conflict.

The indicated deficiencies in the organization for supplying blood, in the opinion of English experts, are evidence of the imperfection of the estimate of the probable combat losses and the corresponding consumption of donor blood. Complications also stemmed from the fact that some quantities of blood were unfit for transfusion. In analyzing the combat operations experience in the Falklands conflict, the British armed forces command suggests in the future, for solving the problems of medical support, to use computer technology more widely.

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FOREIGN MILITARY REVIEW

COMMUNICATING WITH SUBMARINES ON ELF

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 4, Apr 86 (Signed to press 7 Apr 86) pp 76-77

[Article by Capt 1st RANK N. Starov; "Communicating With Submarines on ELF"]

[Text] This year, as reported in the foreign press, according to U.S. Navy command plans, the first [station] of the Extremely Low Frequency (ELF) communications system being built to improve the effectiveness of control of nuclear submarines should be commissioned. The system includes two transmission centers, one of them is located in Chequamegon national park (Wisconsin) and the other near Sawyer Air Force Base (Michigan).

The center in Wisconsin was built for the practical verification of the possibility of communicating with submarines on ELF. At the present time, solid state high power auxiliary amplifiers and also processors for digital processing of the signals being transmitted and units for protecting the transmitting equipment from the influence of electromagnetic pulse are installed in it. Diesel generators are used as an emergence power supply.

General Telephone and Electronics built the submarine receiving equipment, prototypes of which were tested in the Pacific Fleet in May 1985. They employ signals processed by the new AN/UYK-44 computer in digital form and equipped with automatic control units. The receivers on the boats, the firm's specialists claim, provide uninterrupted communications from shore to depths greater than 100 m. At the same time, the boat can maneuver without speed limitations both in patrol areas and in transit.

According to foreign press data, in 1987, it is planned to commission the second part of the system, a transmitting center near Sawyer AFB thereby fully completing work on the the ELF communication system.

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FOREIGN MILITARY REVIEW

WASP-CLASS GENERAL PURPOSE LANDING SHIPS

Moscow ZARUBEZHNOYE VOYENNOYE OBOZRENIYE in Russian No 4, Apr 86 (Signed to press 7 Apr 86) pp 77-78

[Article by Capt 2nd Rank V. Mosalev; "WASP-Class General Purpose Landing Ships"]

[Text] According to foreign press data, in 1985, in the U.S., the keel was laid for WASP IHD1, a general purpose landing ship and the first of 11 units. Its commissioning is planned for 1989. It is reported also that between 1985 and 1990, it is planned to build no less than five such ships.

The ship's design was developed by Litton Industries based on the design, construction and use experience of the TARAWA-Class general purpose landing ships.

WASP has the following basic tactical-technical characteristics: full load displacement, 40,500 t; length, 257.3 m; beam, 32.3 m; draft, 8 m; speed, up to 24 kts; crew, 1,080, including 98 officers. The power plant includes two 140,000 hp turbines operating two screws. In the ship, the hull lines, the make up of the power plant and the habitability conditions of the TARAWA-Class general purpose landing ship were preserved, and it has two aircraft and helicopter elevators located side by side in the after part of flight deck, however, the design and dimensions of the well deck were changed. It can embark a 1,873-man landing party, 3 LCAC-Type air cushion landing craft or 18 LCM-6-type landing craft, and a transport-landing air group. Depending on the ship's mission, the make up of the air group can be modified: 42 helicopters of various types; 6-8 AV-8B SEA HARRIER VSTOL aircraft and up to 30 helicopters (CH-53E SUPER STALLION Transport-Landing; CH-53D STALLION; CH-46D SEA KNIGHT; AH-1 HUEY COBRA Fire Support); 20 AV-8B SEA HARRIER aircraft and 4-6 SH-60B SEA HAWK ASW helicopters. The ship is fitted for the establishment of a 600-bed hospital with 6 operating rooms, freight is stowed in a 9,373 m² area, and military equipment in 2,043 m².

The general purpose landing ship is armed with two 8-container SEA SPARROW air defense batteries with the MK-23 fire control system, and three 20-mm MK-15 VULCAN-PHALANX air defense weapons. The radio electronic equipment includes AN/SPS-52C and AN/SPS-49 radars, and the AN/SLQ-32 EW system. Control of aviation and landing resources, the onboard system for control,

communications, reconnaissance, EW and navigation will be carried out by the NTDS and the integrated tactical system for control of landing operations ITAWDS (Integrated Tactical Amphibious Warfare Data System). All control posts in the ship are located under the flight deck in compartments equipped with a system for defense against weapons of mass destruction.

In American experts' opinion, WASP-Class general purpose landing ships enhance the amphibious forces' combat potential in assault landing operations. It is considered that three WASP-Class general purpose landing ships can replace seven IWO JIMA-Class helicopter landing ships. General purpose landing ships of this type are considered by specialists as qualitative leap in building amphibious force ships in comparison to those built earlier.

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